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INDEX.

JULY TO DECEMBER, 1904.

PAGE.

AFRICA, South. The Lessons of the Boer War and the Battle-Working ofthe Three Arms. A Lecture Delivered before the Berlin Military Society, on 30th March, 1904, by Major Balck, of the Great General Staff: translated by permission 1271 1393

BATTLE, The Russian Scheme of Instruction for; translated by Permission of the Chief of the 2nd Bureau of the French General Staff, from the *Revue Militaire des Armées Etrangères* 1050

CAVALRY, German Ideas on the *Rôle* and Employment of; translated by Permission of the Chief of the 2nd Bureau of the French General Staff from the *Revue Militaire des Armées Etrangères* 825, 947

CAVALRY, The British: Some Suggestions; by Captain E. M. J. Molyneux, D.S.O., 12th Cavalry (Indian Army) 1164

ENGLAND as a Theatre of War, The South of: Some Incidents Affecting the Tactical Employment of the Three Arms in the Southern Counties; by Captain J. W. E. Donaldson, R.F.A. 1257

ESSAY. Third. Subject:—"In the Existing State of Development of War-Ships and of Torpedo and Submarine Vessels, in what Manner can the Strategical Objects, Formerly Pursued by means of Blockading an Enemy in His Own Ports, be best Attained?"; by Commander Murray F. Sueter, R.N. 757

Do. Fourth; by Lieutenant A. B. F. Dawson, R.N. 875

FIELD Artillery, The Desirability of the Acquirement by Infantry Officers, especially of the Higher Ranks, of a more Intelligent Knowledge of, than they generally possess; by Major C. O. Head, R.F.A. 1172

IMPERIAL Defence, The Standard of Strength for; lecture by Lieutenant Carlyon Bellairs, R.N. (Retired) 995

INDIA, The Administration and Organisation of the Army in; lecture by Major-General Sir Edwin Collen, G.C.I.E., C.B., *p.s.c.* ... 798

Do. Campaigns Against, from the West and through Afghanistan; translated and condensed from the Russian of Major-General L. N. Soboleff; by Lieut.-Colonel W. E. Gowan, Retired, Indian Army *(continued and concluded)* 817, 938, 1062

JAPANESE Naval Officers of the Executive Branch, The Education of Imperial; lecture by Lieutenant-Commander K. Sato, Imperial Japanese Navy 1109

PAGE.

KIT and Equipment, Some Notes on an Active Service; by Captain R. M. G. Tulloch, 2nd Royal West Kent Regiment 1410

MACHINE Guns Up-to-date; lecture by Lieut.-Colonel E. Rogers ... 1032

MANCHURIA, The Strategic Features of the Operations in, as Illustrated by European and American Campaigns; lecture by T. Miller Maguire, M.A., LL.D., Inner Temple, Barrister-at-Law ... 1349

MECHANICALLY Propelled Vehicles for Military Purposes; lecture by Brevet Major C. E. I. McNalty, Army Service Corps 1229

NAVAL Reserve, Short Service and the; lecture by Charles S. Jerram 1371

RUSSO-JAPANESE War, Problems of Neutrality connected with the; lecture by the Rev. T. J. Lawrence, M.A., LL.D., Lecturer on International Law at the Royal Naval College, Greenwich 915

SECRETARY'S Notes 1227 1347

SIGNALLING, Regimental; Communicated 1415

SPEED and Consumption of Steamships; by Commander J. F. Ruthven, of the Orient Liner "Orontes" 1179

SUBMARINE Boat, The Future of the; lecture by Mr. Alan H. Burgoyne 1288

VON LÖBELL Annual Reports on the Changes and Progress in Military Matters in 1903, The; *Précis* from the German by Lieut.-Colonel E. Gunter, *p.s.c.* (late) East Lancashire Regiment 1125

NAVAL Notes 832, 955, 1071, 1186, 1312 1418

MILITARY Notes 854, 971, 1082, 1202, 1324 1434

WAR Notes 862, 980, 1093, 1215, 1336 1450

NAVAL and Military Calendar 863, 984, 1097, 1217, 1337 1452

CONTENTS of Foreign Journals 865, 986, 1098, 1218, 1338 1454

NOTICES of Books 871, 991, 1103, 1224, 1344 1460

PRINCIPAL Additions to Library 873, 994, 1106, 1226, 1346 1462

FRONTISPIECES. French First-Class Battleship "Hoche" Opposite 756

Rajah of Bhutan and His Escort ... ... ,, 874

French First-Class Battleship "Suffren" ,, 994

Italian First-Class Battle-ship "Regina Margherita" ... ... ,, 1108

Types of Traction Engines for Military Purposes:—Hornsby Internal Combustion Engine and Messrs. Tasker's "Little Giant" ... ... ,, 1226

French First-Class Armoured Cruiser "Condé" ... ... ,, 1340

LIST OF AUTHORS AND TRANSLATORS.

PAGE.

ANON. (Signalling) 1415

ANON. Translations :—

"German Ideas" 825, 947

"Russian Scheme of Instruction" 1050

"Lessons of the Boer War" 1271 1393

BELLAIRS, Lieut. C., R.N. (Retired) (Imperial Defence) 995

BURGOYNE, Mr. A. H. (Submarine Boat) 1288

COLLEN, Maj.-Gen. Sir E. (India) 798

DAWSON, Lieut. A. B. F., R.N. (Fourth Essay) 875

DONALDSON, Capt. J. W. E. (Theatre of War) 1257

GOWAN, Lt.-Col. W. E. (India) 817, 938 1062

GUNTER, Lt.-Col. E. (Löbell Annual Reports) 1125

HEAD, Maj. C. O. (Field Artillery) 1172

JERRAM, C. S. (Naval Reserve) 1371

LAWRENCE, Rev. T. J. (Russo-Japanese War) 915

MAGUIRE, T. Miller (Manchuria) 1349

MCNALTY, Brev. Maj. C. E. I. (Mechanically Propelled Vehicles) ... 1229

MOLYNEUX, Capt. E. M. J. (Cavalry) 1164

ROGERS, Lt.-Col. E. (Machine Guns) 1032

RUTHVEN, Com. J. F. (Speed and Consumption of Steamships) ... 1179

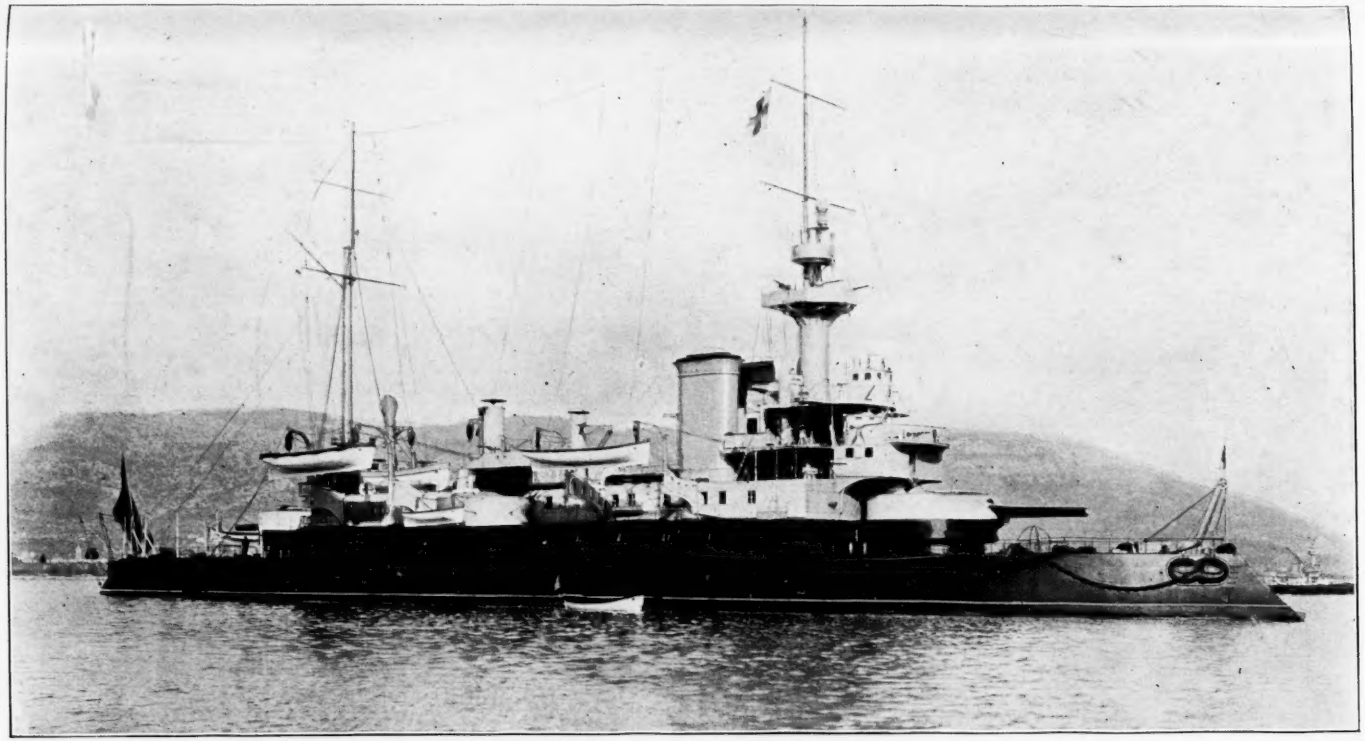
SATO, Lt.-Com. K. (Education of Japanese Naval Officers) 1109

SOBOLEFF, Maj.-Gen. L. N. (India) 817, 938 1062

SUETER, Com. M. F., R.N., (Third Essay) 757

TULLOCH, Capt. R. M. G. (Kit and Equipment) 1410

THE BARR AND STROUD INFANTRY RANGEFINDER.



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THE JOURNAL
OF THE
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THIRD NAVAL ESSAY.

(Recommended to be printed by the Referees.)

Subject:—

"IN THE EXISTING STATE OF DEVELOPMENT OF WAR-SHIPS, AND OF TORPEDO AND SUBMARINE VESSELS, IN WHAT MANNER CAN THE STRATEGICAL OBJECTS, FORMERLY PURSUED BY MEANS OF BLOCKADING AN ENEMY IN HIS OWN PORTS, BE BEST ATTAINED?"

By Commander MURRAY F. SUETER, R.N.

"*Les dessous des cartes.*"

SYNOPSIS OF ESSAY.

1. The problem of the essay centres round the question:—"Has the submarine revolutionised naval warfare of the old type?"
2. Principles of warfare under present or future conditions explained: High-sea warfare and closed-sea fighting. Principles applied to home waters, to Mediterranean, and to China Stations.
3. Demands of this policy:—
   a. Methods of fighting the submarine.
   b. Means of protection against the modern development of the torpedo.
   c. Need of more extended use of prime movers, such as the turbine and oil engine.
4. Concluding remarks.

References.—JOURNALS of the R.U.S.I., Brassey's "Naval Annuals," "Ironclads in Action," Naval Works by Mahan, Jane's Naval Works, etc.

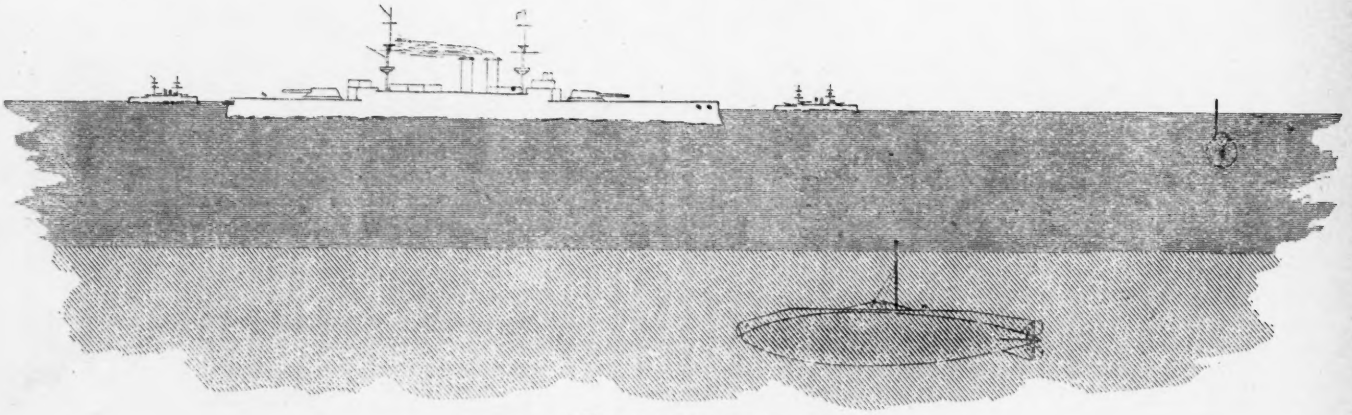
"Look at the submarine boat and wireless telegraphy, when they are perfected, we do not know what a revolution will come about.—Sir JOHN FISHER, Royal Academy Banquet, 4th May, 1903.

INTRODUCTORY REMARKS.

The technical details of the strategy which will be used by any maritime Power to attain the objects formerly pursued by a close blockade must necessarily be of a confidential nature, and may be left to the care of the responsible authorities. But the isolation and mystery which have hitherto surrounded the latest acquisition of modern Navies should no longer be allowed to blind students of naval history to the wider issues of strategic problems, and this year's essay will have fulfilled its purpose if it provokes a fresh consideration of the principles which underlie modern warfare, and if it elicits discussion relating to the probable effects of recent changes in our policy at sea.

We all know that the progress of science gives a new aspect to war, and forces us somewhat reluctantly to cast aside from time to time the old order of naval doctrines. Arbitration may make war less frequent; but the Alaska award, and the consequent Canadian irritation, show how arbitration does not always receive approbation. We might mention here that Great Britain stands almost alone from the rest of the Powers on the question of the "Right of search of neutrals." This presents one of the gravest difficulties of the future, and might turn a war of minor dimensions into one of major proportions. When this comes at last, it will cause radical revolutions of former ideas. For modern Navies are young, and experience alone can ultimately show the difference between the old and the new. Some exponents of maritime strategy contend that past wars will give assistance as guides to the future; others ignore the continuity of history, and believe that the present needs no reference to the past. It is far safer to hold a middle course, and to say that the past will be useful, as history always must be useful. It is a basis for intellectual study, and can help us to grasp the fundamental principles of strategy, which have ruled the conscious or unconscious movements of all great commanders. This sense is conveyed by M. Lockroy's assertion: "The Germans breathe the air of history." But apart from these lessons, the naval strategy of the future is new history; and not only new, but progressive. The expert should not be content with considering the present armaments of the world, but should look forward to future conditions. Yet nations with a past history cannot do this with ease, and are slow in recognising that conditions are ever new. This is especially true of a country in which there is a lack of widespread intellectual development. It might even be argued that there are advantages in the absence of traditions. Germany, the United States, and Japan have no past to thwart their maritime efforts. A nation like England has too many superstitions, and nowhere more than in naval ideas. These survive, not only from a time long past, but also from the early history of the modern Navy. No one can deny that the Navy has been foremost in adapting itself to modern needs; but the writer ventures to think that few people have a sound comprehensive conception of the work which is expected from the Navy as a whole, and of the changes which the latest conditions of warfare may demand as necessary for that work.

Many years are required for the full appreciation of new ideas, and it was natural to find various estimates of the value of the sub-



"HOLLANDS" IN ACTION.

marine boat. These still remain; but there is no need to enter at length on the controversy in this paper. A moderate view of the possibilities of the submarine may win a general acceptance. Whatever future developments may prove, there can be but one opinion at present and for many years to come. The submarine has become an effective, practical, reliable weapon, but it has limitations. Though it is not likely to cause the extinction of battle-ships and of other vessels of the normal type, it must exert a modifying influence on naval strategy and architecture. The question before us bears on the extent of this modification. No finality can be expected on such a debatable subject. The problem of the future war is complicated; but just as the torpedo has changed ideas on warfare, though it has not yet been put to a satisfactory test in actual battles between first-class Powers, so we must concede to the submarine at least a theoretical influence of the same nature.

Problem of the Essay.

This essay will try to show how the naval policy of England has been traditional since the time of Nelson, and how, in spite of the advent of steam and of the torpedo, has not been essentially altered. The assertions that steam bridged the channel and that the torpedo has made a blockade impossible have often been heard, but they rested on no reasoned ground. The time, however, seems to have now come when strategists may ask whether or no a new weapon has modified the fundamental ideas of naval fighting. The submarine is a weapon entirely apart from a battle-ship or a cruiser. If a hostile submarine were to attack such a ship, when under way, the crew of the latter would have no defence, except guns fired at a foe barely visible, and sometimes quite unseen. The submarine with conning tower awash, or with only the periscope[1] showing, forms a poor target even for modern gunnery. In short, under certain conditions, the submarine, in comparison with ordinary vessels, is something insidious. Good strategy must take advantage of its limitations, but it will be better to consider counter methods of offence and defence than to rely on limitations, which will be ever lessening on development.

It is incumbent on us especially to inquire into the influence of the submarine on the operation of blockade; for this branch of warfare is the act of a superior Power, and has always held a prominent position in our naval policy. It is a commonplace to say that modern times have revealed the hidden possibilities of the defence in all kinds of warfare; the direction of modern fighting does not seem to be in our favour, and we are placed at a still greater disadvantage by the development of submarine warfare. The reliance shown by our most formidable rival on the new weapon upsets at once our former ideas of proportionate strength on the two-Power basis. It is hardly possible, then, that future wars will see a blockade resembling any former blockade, and we must ask what substitute we have ready for the purposes of the old blockades. France openly rejoices that we have none ready, and that the problem for us is insoluble.

Enough has been said to indicate that in the opinion of the writer the main point of this essay centres round the function of the submarine. Apart from his own convictions of the truth, the literature of the sub-

[1] See "Hollands" in Action, p. 759.

ject is full down to a certain point, and there is no reason for devoting much space to questions which have been dealt with by the greatest authorities. Admiral Colomb, for instance, read a paper before the R.U.S.I. in 1887, in which he worked out the subject of blockade down to the torpedo-boat, and no essential difference has intervened to alter his conclusions until the menace of the submarine. It might have been expected that recent wars would have given data for the consideration of blockades under modern conditions. The blockade of Cuba in the Spanish-American war did not throw any new light on the subject. It was never really effective. The political situation rendered the strategic problems before the United States War Bureau exceedingly difficult, and, according to Captain Mahan,[1] it was found necessary to impress on all officers the need of caution. The Navy was so small that every unit was of importance. "The matter is left to your discretion," the telegram ran, "except that the United States' armoured vessels must not be risked"; but the attempt to enter Santiago was discouraged in spite of popular opinion, because it was thought that the war might involve the United States in serious diplomatic difficulties with other European Powers. This reason, in addition to the general inefficiency of the Spanish Navy, prevented any contribution to the question.

The Traditional Blockade.

The policy handed down for the defence of this country is simple, and can be formulated in a few words. It has been deduced from the wide abstract rules of strategy as applied to our own peculiar national conditions. The rules referred to are these:—In all sea and land operations, whether defensive or offensive, the success of all movements depends on the disposition of our forces in the manner which will best secure the base of operations, and provide for the security and freedom of communications. It has been said that good strategy consists in placing the right force in the right place at the right time. And here a further military principle—the law of concentration—comes into play. In naval fighting it demands the power of concentrating with the greatest rapidity a superior squadron or squadrons on that portion of the hostile force which may be decisively crushed, or at least paralysed, so far as major sea operations are concerned. This result is attained by opposing a stronger force to isolated groups of the enemy, and by defeating the hostile ships in detail.

When we apply such principles to our own case, and ask how we can concentrate our forces so as to inflict the heaviest damage with the least loss to ourselves, we recognise that our insular position places us on a level different to that of other nations. We have no land defences which can prevent us from assuming the offensive, and the preservation of the command of the sea is essential to our Empire. This has given rise to the view that the sea is our territory. Admiral Colomb wrote of the year 1803:—"In those days there was a definite way of looking at the situation of these Islands, at the water surrounding them, and at the possible enemy's coast. Our Islands were strictly regarded as the Capital of an Empire surrounded by a water territory, the frontier of which was the enemy's coasts." And the winner of the

[1] "Lessons of the War with Spain," p. 188.

R.U.S.I. gold medal in 1902 reasserted the same doctrine: "In a word, our frontiers are the coasts of the enemy."

This short expression: "Our frontiers are the enemy's coasts," sums up the conception which has dominated our naval plan of warfare for a hundred years or more. The Navy's duty was to crush the enemy at once, or to keep a superior fleet afloat which knew where to lay hands on the hostile ships, and to beat them if they showed themselves out of port. Thus the alternatives were:—Win a victory at once over the enemy's fleets at sea, or drive them into port and blockade them.

It will be seen from this what a large part of naval history has been concerned with the subject of blockade. The word, however, has an ambiguity which must be guarded against, but it is perhaps sufficient to mention Admiral Colomb's analysis of the various phases—sealing up, masking, and observing. It might seem natural to suppose that the first operation was universal in the old days, but though foreign writers may find a use in emphasising this view, it is an error to assume that a single method of blockade was favoured to the exclusion of the other methods during any period of history. It is true that Lord St. Vincent's blockade in 1803 approximated to sealing up, but it is noteworthy that Lord Howe adopted a system which watched the Brest fleet from Torbay, and left the work of close observation to the frigates. And here we may quote Nelson's view of the blockade of Toulon to warn us against dogmatising on one aspect of blockades:—"I beg to inform your Lordship," he wrote to the Lord Mayor in 1804, "that the port of Toulon has never been blockaded by me; quite the reverse, every opportunity has been offered to the enemy to put to sea, for it is there that we hope to realise the hopes and expectations of our country."

When a blockade of the enemy was resolved upon, the first step followed from the doctrine that our frontiers are the enemy's coasts, and consisted in carrying the operations to the points at which our sea territory joined with the land territory of the enemy. The stringency of the blockade naturally depended on the superiority of the watching fleet, but partly also on the objects aimed at. It may be said that a blockade had, and has, three main objects. The first is to hinder the junction of the enemy's detached fleets or units; the second demands, as in the words of Nelson quoted above, that the enemy must be watched so that he cannot put to sea without being brought to action, and the third object aims at confining the enemy's fleets within a cordon of ships behind which merchant vessels can move freely without fear of capture or need of extensive systems of convoy. It will thus be seen that the capture of enemy's ships seeking to take refuge in a harbour was preferable to ingress, but if capture was impossible, it was better to allow the ships to enter a port which was blockaded, and to know that they were kept under watch and prevented from doing further harm.

We may look at historic blockades. In 1761 Brest was so closely watched that Hawke could affirm that hardly a vessel of any kind had been able "to enter or come out of the port these four months." Lord St. Vincent improved on this, and in 1803 his "defensive" disposition was most elaborate. Apart from the extraordinary "triple bulwark" against the invasions, arrangements were made to keep a normal watch on a total of 37 sail of the line, 17 frigates, and 5 smaller ships in the four ports of Brest, Rochefort, Ferrol, and Toulon, 46 English sail

of the line, 19 frigates and 30 smaller vessels in all being told off for this duty. The blockade established from 1861 to 1863 by the Federals may be compared with this. It is interesting, not only from the successful sinking of a new ship, the "Housatonic,"[1] by a most imperfect weapon handled by desperate men, but also from the fact that the period was one of transition, the application of steam for maritime uses, and the invention of torpedo warfare being then in their early stages.

The Anaconda policy demanded that the enemy's country should be surrounded by an impassable barrier. The object, therefore, was slightly different from that of the blockades in the French wars. For now the Federals attempted to prevent ingress no less than egress, and to injure the enemy's territory by cutting off supplies. This was actually sealing up, and steam made it effectual, while the earlier blockade of French ports, even when described as close, had been loose, and dependent on chance. Single ships could hardly escape from steam blockades, but whole fleets had evaded sailing-ships. The War of Secession disproved the statement of the Commissioners of 1860, that "the efficient blockade of an enemy's fleet had become well-nigh impossible."

The invention of the locomotive torpedo may be said to have first seriously raised the question of the possibility of blockade; that is, of a close blockade. The French argue that the torpedo has made the recurrence of the blockade of 1805 impossible for ever, and they mean not only that it would be difficult for an enemy to watch the French ports by means of vessels designed for scouting, but that it would be unsafe for an English fleet to stay in the Mediterranean or in the Channel, because there is the risk of a rush from torpedo craft. The French tend to give up the armoured battle-ship, and to rely on the speed and invisibility of a host of small fast vessels equipped with torpedoes.

But English strategists have argued that it was a mistake to assume that the torpedo-boat had made blockade a thing of the past, however much it may have modified the manner of a blockade. "To us," wrote Admiral Colomb, "the sealing up of an enemy's port can rarely be the object. We are not in the position to attempt it, and consequently our blockade will seldom extend beyond masking and observing." This is not to abandon the essence of a blockade. It is but a return to Lord Howe's policy, and these words of the modern writer express exactly the same idea as that conveyed in Nelson's description of his operations off Toulon.

We cannot attempt the rival method of a close blockade for two reasons. Our position in Europe is different to-day, and modern warfare has aided the defence to the disadvantage of the offence. Our naval superiority is not proportionate to what it was even thirty years ago, and it may be doubted if we could more than barely apply our estimate in a war with a single first-rate naval Power. The Admirals' Report of 1889 estimated the strength needed by a blockading or masking force. It stated that a proportion of five battle-ships to three, and of two cruisers to one was required to make an effectual blockade. Admiral Sampson writes in the *Century*:—"The conclusion that the English have reached, based on annual trials, is that it takes

[1] First success of a submarine boat.

about three ships to blockade one. I think it is also their conclusion that in ordinary circumstances (I would not say the special circumstances of Santiago, but where the opening of the harbour is moderately great) while one or two ships at a time may be blockaded, it may be expected that some of them will escape."

The annual manœuvres fully justify this opinion. The combined Mediterranean manœuvres of 1902 were carried out to discover what risks were involved in keeping such a close watch on a fleet in a defended position, as to ensure bringing it to action, if it issued out into the open. Close watch was maintained for five days. It showed that, however carefully a port may be observed, the slip can be given to the fleet watching. The risk of torpedo attack prevents a blockading force from standing close in shore. Safety can only be secured by retreating at night to such a distance that a torpedo-boat flotilla could not reach the fleet between sunset and dawn. Thus it becomes impossible to prevent isolated vessels from running the blockade; and it may be asserted that if the Spanish had shown more energy, and had used their destroyers for attacking and making feints during the night by hugging the shore on a dark night, and by similar expedients, more than one of their ships might have slipped out of Santiago, even after Admiral Sampson took over the command, and made his dispositions. When Admiral Schley was in command there would have been no difficulty, because he was content with a most loose form of blockade. A whole fleet would be at a disadvantage in trying to break out of a watched harbour; but the manœuvres of 1896 proved that a haze is sufficient to cover the movements of a squadron.

The torpedo-boat destroyer has somewhat modified these risks, and a patrol of destroyers could provide a defence against a raid by torpedo-boats. But though faith is still firm in the destroyers, these craft are liable to breakdowns, and have a limited coal supply. Hence a fleet of battle-ships is hardly likely to place strong reliance on them. To remain in the immediate neighbourhood of the enemy's port would be a grave danger, and would expose the ships unnecessarily. While, then, a close blockade of a resolute enemy has been pronounced impossible in normal cases, a military blockade, designed to prevent junction and to bring a fleet to action, still remains a paramount feature in strategy. The superior force may "contain" or mask the enemy's fleet by posting itself in such a position that the enemy must pass it. This will ensure an opportunity for battle, should the enemy venture out of port. The operation necessitates a few observing vessels off a port, able to evade the newest forms of attack, and having their signalling powers developed to the utmost. The battle-ships can lie in a harbour or in a base, whether permanent or temporary, and a line of cruisers can supply links of communications. When the enemy's ships put to sea, the main squadron, having received intelligence of the movement, can bring the enemy to action, or force them to return to port. A quiescent watch of this kind is identical with Lord Howe's method of waiting in Torbay, or with Nelson's watch over Toulon. But wireless telegraphy has introduced an element favourable to the watching fleet. When long-distance reception and synchronisation of instruments has become more perfect, an admiral, by making his dispositions from a distance scarcely credible in former times, may save the coal consumption of his ships enormously, and make one cruiser do the work of two.

It is, therefore, easy to argue that the English policy of building battle-ships, cruisers, and torpedo-boat destroyers has been right in the past, because the nature of the blockade has not differed in strategy for a century, though the tactical difficulties may have increased. Steam has made strategic movements more certain, but it has caused a greater dependence on bases, and has limited the range of action. The power of sailing-ships to keep the sea was restricted mainly by the quantity of water and provisions which they carried. But the period for which a modern ship can remain independent of a port is determined by coal endurance and by the need of attention to delicate machinery. It is difficult to lay down any rule as to the striking power of a ship. This depends so much on the type, coal capacity, and like considerations. But the radius of action is limited, and, as we have just said, has brought the question of bases into prominence. The torpedo is the other innovation of late years. It is true that it has made the lines of blockade recede, and that its future possibilities are hardly yet realised. It is tactically a gun of great power, but of limited range; and since it has hitherto presupposed a torpedo-boat, which must present a surface to gunfire, it cannot in itself be rightly held to have altered the recognised doctrines of modern warfare.

The Effect of the Submarine in Modifying Old Doctrines.

But what are we to say when this weapon can be discharged in such a manner that practically no surface is exposed to gunfire? There can be no doubt of the destructive effect of a torpedo. A charge exercises its greatest explosive power when in intimate contact with a floating enclosed body, and this has been tested and proved from the time of the blowing up of the "Dorothy" by Fulton in 1805, down to the latest experiment on the "Belleisle." The torpedo in a torpedo-boat or in a destroyer is dangerous enough, but the shortness of range is a compensation, for torpedo-boats or destroyers have to depend on pressing home their attack unobserved. If they were detected, they may be kept off by gunfire, and can be obliged to discharge their torpedoes at a long range. But the torpedo in a submarine-boat introduces a new element into warfare, and though it may seem a small element, it strikes at the root of our naval policy. Our strategy in war has laid down that the command of the seas can be maintained only in two ways: by the destruction of the enemy's vessels in a fleet action, or by blockading the hostile ships when they do not dare to face us. The problem before us resolves itself into the question whether it is any longer possible to maintain these two positions. The danger of the submarine boat makes it probable that in the next war we may not be able to look on the enemy's coast as our frontier. And if this is so, how can we attain the ultimate aim of a blockade—the command of the sea, whereby we may render the enemy powerless, and secure England against a restricted supply of provisions?

The question must be faced, and though sentiment may rebel at a change in our doctrines, sentiment must give place to safety. It is idle to maintain theories, such as our frontiers are the enemy's coasts, if we are impotent to put them into practice. We may hold that naval strategy is unchangeable, but we must not say that it is wholly independent of the engines of war. The elementary principles of strategy do not vary, but have the same validity for all ages. Such laws, however,

are few and general. The manner of using our weapons and the weapons themselves change from time to time. The details of war thus depend on the value of the latest scientific invention. Whenever an important invention is introduced the question may arise:—"Is this distinct from other methods of fighting, or is it merely of the same nature as existing types?" Our answer in the case of the submarine will have to be a compromise. But if some treasured doctrines may be assailed, the writer can only ask for better substitutes. Even if we start from the hypothesis that the submarine is an effective weapon within limitations, there can be no doubt that modifications will be needed in our methods of warfare. A calm view of the question will hardly say that the submarine is an unsound idea, and will be useless in a naval war, nor that the battle-ship is doomed, but will consider the capability of the battle-ship and of the submarine in the different spheres suitable for each. It will not be a sign of weakness to admit that our present policy needs a change. It is best to neglect nothing in war, but it is wrong to rely on one single type of weapon. Mr. Arnold-Forster said, in 1900:—

> "The Admiralty are not prepared to take any steps in regard to submarines, because this vessel is only the weapon of the weaker. If, however, this vessel can be rendered practical, the nation which possesses it will cease to be weak, and will become really powerful. More than any other nation we should have to fear the attacks of submarines."

Why? Because the submarine strikes at the possibility of our traditional blockade.

Future Strategy.

The submarine has brought in the necessity of a twofold set of tactics. Our squadron warfare is still valid for the open sea, but we must devise new methods for offence and defence in closed waters. It is right that a Power, which aims at being a match for any two other Powers, or at making it undesirable even for any three Powers to attack her, should be ready to meet any and every policy of war. Against those nations which do not possess submarines for the defence of their coasts we can still fight on the lines which have been perfected and formulated in preceding years. Germany will for many years be behindhand in respect of submarines. If Germany were our single adversary squadron warfare would still be practicable, and a blockade of German ports would be our objective, though this would be a harder task to-day than formerly.

It must be remembered that her destroyers and torpedo-boats can pass from Cuxhaven,[1] on the Elbe, to Wilhelmshaven, on the Jade, and from there, either by the Ems-Jade Canal to the Dutch boundary, or can keep within the fringe of islands, which are separated by seven main channels, from any of which an attack could be delivered on a blockading fleet. The Elbe, Weser, Jade form a huge estuary covering the important towns of Hamburg, Bremerhaven, and Wilhelmshaven, as well as the entrance to the Kiel Canal. A natural defence and naval stations are thus provided for these towns.

[1] See chart of Germany.

Open-Sea Warfare.

We pass to the consideration of war with a country using submarine boats, and here, as we said, we must employ a double method of war. We may take this as our general principle, that narrow waters, if known to be near submarine stations, are untenable for ordinary war-ships. If we admit that the submarine is reliable in its own sphere, we must recognise that a change is necessary, not only in the disposition of our forces, but also in the ports which we have chosen for our bases.

The radius of one of the smallest type of modern submarines is 400 miles from a coast on the surface, and 25 miles under water. Big ships will no longer be able to come within this latter rough estimate without considerable risk. Hitherto torpedo craft have been able to go within sight of an enemy's port, and to trust to their speed for safety in reconnoitring. But now even these fast vessels will not come within the range of submarines without running a risk. And the risk will be greater for battle-ships and cruisers. There is no alternative, except that battle-ships must avoid all narrow, close waters infested by submarines, and must keep well out to sea. If they venture within the range of submarines, they must be so constructed that the explosive effect of a torpedo is minimised. Instead of blockading the enemy's ports, fleets must take to high-sea operations, and give up the old coast fighting. If only the enemy will submit to be met at sea this policy is nothing new for a superior Power. It has always been held that such a Power must try to annihilate the enemy's ships in a fleet action, and the blockade has come as a second step. The battle-ship must still be the fighting unit on the ocean, and squadron warfare will be as important as ever. Future battles will not be a confused *mêlée*, but the side which has the superior tactical and scientific training will beat a numerical equal. Fleets will still be able to employ that species of blockade which prevents the junction of an enemy's forces, but instead of masking fleets in ports it will have to mask fleets from different maritime nations, or from different stations. The entrances to narrow waters must be watched, and positions like Gibraltar will assume even greater strategic value than they have hitherto possessed. Temporary evasions of fleets may be ignored, but care should be taken to ascertain their position, and every effort made to account for all detached units of the enemy immediately on the outbreak of hostilities. This would need very careful shadowing and much skill to prevent conventions of International Law being infringed prior to the interruption of diplomatic relations. Homogeneous squadrons of modern Navies must be concentrated in the most advantageous positions with as great a rapidity as possible. It will be seen that the speed of the battle-ship and cruiser is the most important factor in squadron strategic movements. The use of torpedo destroyers acting with a fleet has already been questioned, and it seems plain now that such vessels must give place to the "Scout" class, which will considerably add to the efficiency of a fleet, and are the natural development of the destroyer without its defects, we trust. It appears, then, that the battle-ship is far from being doomed. The words of a high naval authority in February, 1902, are still mainly true:—"I think the reason for building big battle-ships is not generally known. We have to fight all over the world, and we shall have to fight very often at the enemy's bases." For this reason Admiral Dewey and Captain Mahan must be wrong in advising

the Bureau of the United States to build smaller ships,[1] for if ever a nation needed large battle-ships, it is the United States, whose military frontier is Europe. Large battle-ships can never be replaced by armoured cruisers, which, though they are able to avoid a battle-ship by superior speed, cannot prevent or interfere with the offensive action of the more powerful vessel. The importance of cruisers and vessels for scouting cannot be underestimated. Since the areas to be watched are magnified under present conditions, the success of dispositions, depending as it does on accurate knowledge of the hostile movements, will be due to the speed of the cruisers.

It cannot be said that this is an easy or a satisfactory substitute for the blockade of an enemy in a port.

Lord Selborne has stated that it is the duty of our Navy to seek out and to destroy the enemy's ships in every part of the world. But it is possible that, knowing the difficulty of enforcing a blockade, the enemy may keep their battle-ships behind their defences, and may send out cruisers and smaller ships to give trouble to commerce and to make diversions. If a country stands on the defensive, the greatest battle squadrons in the world can do nothing against coasts guarded by torpedoes. They might attempt to land on the shore, to bombard the fortifications, or to blockade closely, but they run the risk of destruction by torpedoes from submarine-boats and other craft with a torpedo armament. The junction of the Toulon and the Brest fleets may be prevented, but there is no means of making them put to sea and fight, and while the blockading ships may have to keep the sea and deplete their bunkers, the enemy may remain all the time quietly in harbour.

Such a system of defence would cause a dead-lock, just as a modern authority has thought that the present development of armies has endowed the attacked with such advantages that it can wear out the offensive. This theory supposes that hostilities will be resolved into waiting for the other side to take a false step. However, it is hard to believe that any country could resort to this plan of campaign, and the French naval policy will show that they, at least, have no intention of waiting behind forts while their commerce and colonies are at the enemy's mercy. The teachings of the Spanish-American war show that even with such an inferior fleet as Admiral Cervera possessed, he had to bow to diplomatic and popular opinion. All diplomatists are not like Marlborough, who never forgot to consider the naval officer's side of the question. The unfortunate Spanish Admiral did all in his power to get his fleet properly gunned and equipped with munitions of war; but he was forced to put to sea for what, as far as he knew, was certain destruction. This occurred first on leaving Spain, and, secondly, when Santiago felt the pinch of shortness of provisions.

French writers on maritime warfare recognise three main divisions, which they name:—

La guerre d'escadre.
La guerre de course.
La descente.

[1] Small battle-ships were advocated on account of the shallow Atlantic harbours, but this objection to larger ships may be overcome by dredging operations where necessary; every nation must sooner or later increase her dock accommodation for large battle-ships.

The first may be practicable in fighting a Power like Germany; France, they say, needs battle-ships for such a war. But this method has long been abandoned in view of a war with England. A "glorious defeat" is all that they can expect, for they will be crushed by the mere weight of numbers, and each year's programme makes this conclusion inevitable to their thinking. Therefore, they have resolved to fall back on the second mode of fighting. They see that Great Britain, more than any other nation, must have imported food and raw materials. Scarcity of provisions and difficulties following on the closing of factories must result if the British commerce is harried.

"In renouncing squadron warfare," a French statesman has said, "a nation does not renounce building ships with powerful engines, armed with heavy guns, capable of keeping at sea for a long time, and destined for privateer warfare. Such is the rôle of cruisers." Their plan is to build numerous cruisers, and to send these against armed merchant-vessels, and generally harass commerce. Speed and radius of action are the essentials of these armoured cruisers, for England is expected to have cruisers also in readiness for commerce protection. Against this second mode of offensive warfare we would chiefly have to contend, and the only means of dealing with it will be to patrol with a large number of fast armoured cruisers the routes of commerce and the sea through which the enemy's cruisers will have to pass before they can gain the ocean.

Closed Water Warfare.

We have now dealt with squadron warfare, and, with the exception of the warning that battle-ships must keep in the open, and that the lines of blockade have receded to the patrolling and masking of distant divisions of the enemy's forces, we have found that no essential modification of present-day methods is needed. It is when we pass to the question of narrow waters and of coast operations that we may expect the greatest differences. We must reconsider the geographical conditions of our coasts, and of those belonging to any possible combination against us. This, of course, is difficult, because no calculation can fortell naval alliances and movements. But it is clear in what parts warlike operations would be most serious and are most probable. Though our bases are scattered in the best positions over the world, the chief strategic stations which we need here consider are the Channel, the Mediterranean, and the East.

I.—The Channel and Home Waters.

The defence of the Channel has become an article of faith with us, and strategists have emphasised the view that safety lies in its preservation. This is true, and always must be true. But the means of securing its preservation may vary, and it is time to see if our accepted system of national defence can be advocated for the future. The bases on our South Coast date from a time when France was our only rival. They were convenient for access to the French coasts, and yet were in no danger of surprise raids.

It may now perhaps be thought a less heresy than formerly, if we are inclined to doubt the strategic importance of our chief arsenals. The French have long asserted that the torpedo has made the Channel untenable; but the English view has been slow to grasp this. Naval

manœuvres of recent years, however, have proved that the English shores of the Channel are well within range of a torpedo attack from the stations which have been established from Brest to Dunkirk. Moreover, we have lately heard how the balance of power has shifted from the South, and that our East Coast needs ports to act as bases against the new rivals across the North Sea. If we have accepted this, it is only a small step to go farther and to say that the Channel will be useless for supplying *points d'appui* for our battle-ships. As dockyards in time of peace and as centres for defensive measures in war, the harbours will still retain their value, but their importance as bases of offensive operations is problematic, unless we can control the Channel as completely as in times past. This seems to be made an impossibility by the entrance of the new weapon on the scene. Our fleets in the Channel for the future will be unable to leave a closed port without running the greatest danger of attack from the invisible enemy. Cherbourg is within sixty miles of Portsmouth, and flotillas of submarines are stationed there, whose range of action easily extends to the whole length of our South Coast seaboard. The comparative cost[1] of a battle-ship and a submarine should make commanding officers cautious in exposing large ships to a one-sided warfare. It will be best to withdraw such ships from the Channel in the event of hostilities, and to recognise that our front to the Atlantic will henceforth take the place of the Channel in a struggle with a combination of first-rate European Powers, when France is one of the coalition. We must rely on torpedo-boat destroyers, torpedo-gunboats, submarine-destroyers,[2] and submarines in touch with the shores as a protection to the coasts. It will be no gain for our offensive policy if we keep battle squadrons within range of the enemy's torpedo craft, surface or submerged. The risk of loss to *personnel* and material would be disproportionate to the advantage. And as regards the defence, the fleets can go farther afield, knowing that the ports and the Channel can safely be left to the care of destroyers and submarine boats.

Whatever is thought of the value of the submarine, all in England agree that it is the weapon most suitable for defensive warfare. It would be easy to show how this has been realised as the most useful sphere of work for these boats; but no steps have been taken in considering how our ports can be made secure by this method. Yet it is simple and inexpensive to protect a port with submarines. These boats, assisted by look-out craft with a greater range of vision from bridges and from a higher free-board could resist every form of attack, while a boom defence across the mouth of a harbour is sufficient to guard against surprise or against an enemy which might succeed in evading the watching boats. Submarines running on the surface can patrol the neighbourhood just as if they were torpedo-boats. Indeed, it has been recognised that the ordinary torpedo-boat will largely disappear in favour of the submarine boat; but this will chiefly affect foreign Navies, which still build torpedo-boats, whereas we only order a few to replace the old. Instead of having our principal ports defended by a complicated system of R.E. mines, we need a fixed number of submarine boats for guarding the approaches. Every year

[1] Twenty improved "Holland" boats can be built in America for the cost of one battle-ship.

[2] See suggested submarine destroyer, p. 782.

we spend enormous sums of money on defensive submarine mines, Brennan torpedo installations, and the like. Those are useful in defending small areas; but this is not enough, and they can only be used in fine weather, when it is possible to see clearly that an enemy and not a friend is passing over the mine-field. But submarines could approach an invading enemy and launch torpedoes with perfect certainty, while their mobility would enable them to extend their utility over a far larger area.

The Channel, then, must be defended as carefully as before, even more carefully, because the dangers are more insidious. But our big ships will be unable to use the ports for refitting or for coaling as under former conditions. These and adjacent harbours, no doubt, will be turned into stations for torpedo craft, just as the French provide accommodation for submarines at each of their old ports, Cherbourg, Rochefort, and Toulon.[1] Half of these are kept in commission and ready for use. An ideal submarine station would resemble Bizerta. The requirements of the boats are small, and may be classified thus:—

1. Gasoline storage.
2. Small shop for electrical repairs.
3. Charging station for electric batteries.
4. Charging station for air.

3 and 4 are not essential. If there is plenty of gasoline the boats are self-contained, and can charge their own batteries or fill up their air flasks[2] as necessary.

No doubt English destroyers could form a cordon round ships compelled to enter the south ports, but the risk of attack demands that more convenient bases should be found elsewhere for repairing stations.

It has been suggested that we want a port, or ports, on the East coast. It is doubtful if any large naval station is needed in this quarter, except on the northern half of the coast line. A few lightly defended stations with strategic positions well considered, capable of sheltering a squadron or merchant-ships, might be useful. We ought, no doubt, to have docks available, and the ports ought to be defended here no less than on other parts of our sea front; but unless we assume that

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[1] We subjoin the latest complete list of submarines at French stations:—

At Cherbourg:—The submarines "Narval," "Sirène," "Silure," "Espadon" and "Triton," and the submarines "Morse," "Français," "Algérien," "Naïade," "Protée," "Lynx," "Ludion," and "X," one of the newest type.

At Rochefort:—The submarines "Loutre," "Castor," "Otarie," and "Z," one of the newest type.

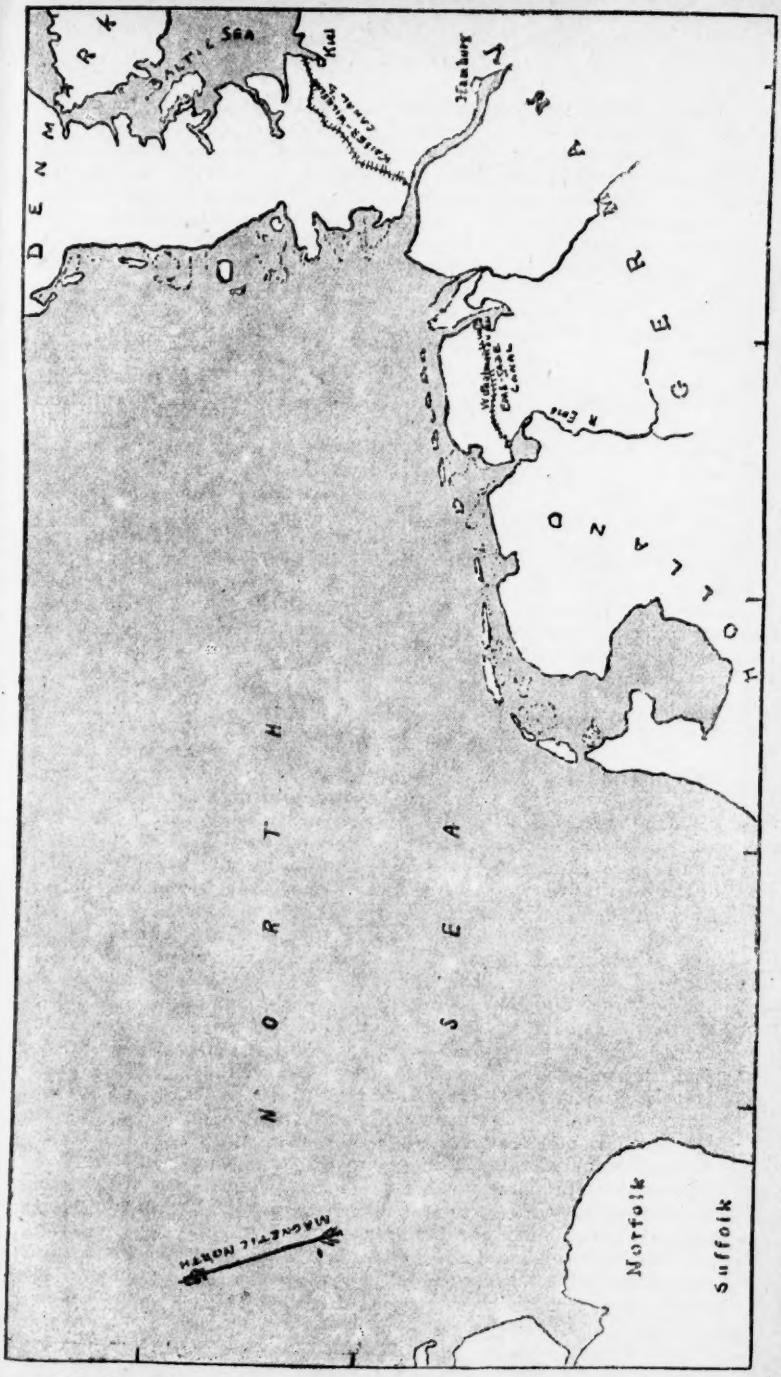
At Toulon:—The submersibles "Aigrette" and "Cigogne," and the submarines "Zédé," "Gymnote," "Perle," "Esturgeon," "Bonite," "Thon," "Souffleur," "Dorade," "Grondin," "Anguille," "Alose," "Truite," and "Y," one of the newest type.

At Bizerta:—The submarines "Farfadet," "Korrigan," "Gnôme," and "Lutin."—(*Nineteenth Century*, November.)

[2] In the "Holland" type of submarines.

Germany, who is already building submarines at Kiel, will never fight with any but surface vessels, the North Sea to the south will be an area too confined for the safe operations of battle-ships. The east coast of Scotland seems sufficiently remote for the purpose of supplying a coaling base, and if it were considered safe for our big ships to work lower down, it would be possible to provide a temporary base on our east coast. But the only open ports may be sought on the west coasts. It seems that this view is gaining ground, and the rumoured station at Galway Bay is a recognition of the rising importance of the Atlantic. We may remark how commerce must influence the disposition of our forces. The geographical position of our source of corn supply has, within the last few years, shifted from the Black Sea to the Western States of America. We want more bases on the west, not only smaller stations, but facilities for repairing in St. George's Channel, and in the seas which are likely to take the place of the Channel. We need not enter into the question which ports will be most suitable, but it must be emphasised that our bases are moving from the south to the west and north-west. It has long been seen that we want more dockyards. Our present yards are now congested. Formerly Portsmouth built more ships for the Navy, now the chief work consists in repairing and refitting. It is no new idea to suggest bases in the north. It has often been pointed out that we need minor bases for cruisers in the extreme north of Scotland, since, in any war with the Northern Powers, it is round the north of Scotland that raiding cruisers and large merchant-vessels will strive to reach the ocean. The expansion of the German Navy has brought the necessity of providing a means to check her fleets from leaving the North Sea. The smallness of the German coast and the concentration of more than half of her commerce by sea in the port of Hamburg would make it a not very difficult operation to interfere seriously with her trade.

It will no longer be possible to remain content with the so-called command of the Channel. Command is, indeed, out of the question, and the policy of an efficient defence of our coasts is a poor substitute for the sweeping of the sea. We must control both ends of the Channel. Dover should be made a station for commanding the east end, and torpedo-gunboats, destroyers, and submarine boats should be placed here with the object of preventing a junction between French, German, or Russian fleets. The annual manœuvres have demonstrated that the mere threat of a torpedo-boat attack is sufficient to obviate a junction of an enemy's forces, and submarine boats will be an additional hindrance. The other end of the Channel should be held by an effectual patrol of our cruisers, just beyond the dangerous limits of a submarine attack. This method will have the object of meeting the enemy's fleet by a rapid concentration, and of cutting off the isolated cruisers, which may be expected to attempt *la guerre de course* by gaining the open sea. But there is a third point at which adequate patrols must be stationed, and these will be a guard against other members of a coalition against us. We have already said how the strategic conditions on the east coast have altered. The requirements of the expansion of German trade and of naval strategy have caused every available channel to be dredged and important engineering works to be undertaken to utilise to the utmost the long and intricate channels. The idea is to make the Baltic and North Sea coasts as safe as possible from attack. The Germans have finished the Kaiser


DENMARK
BALTIC SEA
Kiel
Kaiser Wilhelm Canal
Ymuiden
NORWAY
Christiania
Christiansand
Skagerrak
Stavanger
Bergen
Aalesund
Trondhjem
Hernosand
Gefle
Stockholm
Wisby
Gothland
Carlscrona
Calmar Canal
Malmo
Copenhagen
Elsinore
Helsingborg
Gothenburg
Christianstad
Ystad
Trelleborg
Ronne
Hamburg
Elbe
Heligoland
Cuxhaven
Wilhelmshaven
Emden
Ems
Dollart
Zuyder Zee
Amsterdam
Rotterdam
Helvoetsluys
Flushing
Ostend
Dunkirk
Calais
Boulogne
Dover
Ramsgate
Margate
Yarmouth
Lowestoft
Norfolk
Suffolk
NORTH SEA
MAGNETIC NORTH

Wilhelm Canal from Kiel to the mouth of the Elbe, joining the Baltic to the North Sea.

Hitherto there has been nothing to prevent our fleet from blockading the narrow Skager Rack and Cattegat, and thus to seal up the Baltic. The existence of the canal makes it possible for Germany to defeat this operation. We cannot prevent the entrance of the entire German forces into the North Sea, and unless Germany is actively co-operating with us, we can no longer hope to keep the Russian fleet within the Baltic. Even without the danger of the submarine the problem is difficult for us, and unless we are in a position to win a victory by a decisive stroke, it can only be met by a virtual sealing up of the whole North Sea. If our coast is adequately defended, the Straits of Dover and the islands to the north of Scotland will be the chief points for this. We must do our best to command the sea in a line roughly drawn from the Shetland Islands to Norway,[1] or in any similar line which will prevent the enemy from travelling round our north shores into the Atlantic. It will be a hard task, for the shortest distance is over 200 miles, but only in this way can we hope to hem in the enemy and to prevent them from effecting a concentration with their divisions or allies in other parts of the world, and from gaining the Atlantic to prey on our merchant-ships. And in the case of Germany this method would disarrange the German food supply, which depends on the sea, since inland frontiers may not be secure. Resistance, German writers agree, is only possible if communications by sea are kept open, otherwise starvation will compel surrender.

II.—The Mediterranean.

In the Mediterranean our most powerful squadron is in commission, but it is remarkable that only in the event of a war with France or Russia would the course of hostilities be affected. It has long been the ambition of Russia to assert her influence in the Mediterranean as soon as her defences are secure in the Black Sea, and it is significant that there is now a large Russian force within easy distance of the Mediterranean. Russia cares little for the formal protest from England against the passage of torpedo-boats through the Dardanelles in time of peace, and it is not to be expected that her scruples will be greater in war. Light gun-boats in the service of embassies and a few gun-boats for protecting the works at the mouth of the Danube are allowed to use the Dardanelles. Further, the Sultan may allow fleets of friendly Powers to visit Constantinople, and there is no reason why the Russian Black Sea fleet should not at any time be invited, provided that the conventions of 1856 are observed. Even now, the large transport service, officered by Russian naval officers, is preparing for a continuous programme of conveying immigrants and the like through the Dardanelles and Mediterranean. In the event of war with Russia, England would thus find herself opposed by a fairly strong force. It is true that this force would not possess that quality of homogeneity which has come to be recognised as an essential to an effective fleet and which is noticeable in our Mediterranean Squadron.

The strategic position of France is even more important, and nearer our subject. She wishes the western part to be a French lake,

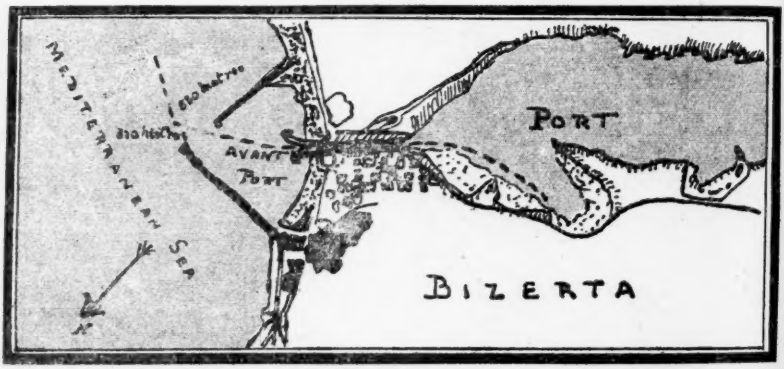
[1] See Wireless Telegraphy Chart, p. 778.

and her possessions in North Africa threaten to extend her influence to Morocco. By far the finest portion of the French Navy is in the Mediterranean, while the part maintained in the Channel and Atlantic is comparatively small. Admiral Aube advised that battle-ships should be kept at Toulon and cruisers at Brest. But though Brest is an admirable base for cruisers, the French show no disposition to concentrate them there in large numbers. In time of war, then, the best French

force would be concentrated at Toulon. And, in addition to this, they have a further offensive programme. They hope to organise nests of submarines and torpedo craft along the narrow flanks of the Mediterranean Sea, the Straits of Bonefacio, between Corsica and Provence, between Sardinia and Bizerta, between Oran and the coasts of Spain. This is the French policy. It may be found in M. Pelletan's speech on the French Naval Budget for 1903. The policy is a danger to us, when our ships pass Bizerta at a normal distance of sixteen to

eighteen miles,[1] and French submarines are now practising and training with designs against our ships in time of war. Bizerta has great topographical as well as geographical advantages,[2] and is well situated for cutting off our thoroughfare to the East. It will be seen that in the narrow limits of the Mediterranean the question of the range of the submarine scarcely occurs, even if we do not take into account the position of Sardinia and Corsica as natural stepping-stones. We may add that the French policy has a further idea. If our trade route to Egypt is blocked, the way lies round the Cape. But this France prepares to cut off by *guerre de course*, operating from Brest, Dakar, and Martinique, and from Madagascar and Diego Suarez.

How, then, can we deal with the plan in the Mediterranean? England can never abandon her right to exert a leading control in the sea. A blockade of Toulon is no longer admissible. Are these two statements incompatible? The difficulty has led to the suggestion put forward in "An Impossible Programme," that the Mediterranean



Fleet should be withdrawn as a means of conciliating Europe and of readjusting our position as holders of a world-wide Empire. There is much to be said in favour of this. France must always have the strategic advantage in the inland sea. The Suez Canal would probably be blocked in war, unless we could declare it neutral, which is unlikely. But evacuation seems far too radical a proposal, and the moral advantages are few in comparison with the strategic disadvantages. A partial evacuation would be better. Our energies will be best employed in keeping our fleet safe from torpedo attack, and since a blockade of the enemy's bases is no longer possible, we must bar the passage through Gibraltar into the ocean. Aden must be held in the same way. A few years ago it would have been rightly objected that it is better to assume the offensive, and to seek out the French and Russian Fleets before they could concentrate for an attack on us. But it is difficult to see how our battle-ships are to assume the offensive now in the narrow waters without running too great a risk from torpedo attack. But the objection has weight, and while we withdraw our

[1] See submarine strategic chart, p. 775.

[2] See chart of Bizerta.

battle-ships temporarily out of harm's way, we must send cruisers, torpedo-boat destroyers, and submarine destroyers to try and clear the sea of torpedo craft. In addition to a torpedo-boat destroyer with a guncotton charge on the end of a spar the following devices may be used against submarines:—

1. Explosive charges towed by fast craft.
2. Small torpedoes fired with a time-fuse, adjusted to explode over a submarine if bubbles are seen.
3. Steam pinnaces, carried by all large ships, armed with a spar torpedo—usually termed an outrigger torpedo-boat.
4. Miles of fishing nets fitted at various intervals with small gun-cotton charges, battery, circuit-closer, and soluble insulator, for safety to those laying.
5. Spans of grass hawser fitted with cork floats in the middle and weighted at the ends to upset the longitudinal stability of a boat which might run into them.
6. Blockade mines dropped off submarine bases of enemy.

If the French have patrolling lines of submarine and torpedo-boats running north and south, we must have a counter line joining Gibraltar and Malta. But we must not think of abandoning the base in the Mediterranean, as the author of "An Impossible Programme" and his followers propose; we ought far rather to see about strengthening our position in the Eastern Mediterranean, and to negotiate for a base in this quarter. Malta is admirably situated to prevent a junction between French and Russian fleets, and the efficient dockyard can do work equal to that of the home ports. Gibraltar and Malta must be prepared to be isolated, and must be defended by submarine boats and by destroyers. Gibraltar can be made impassable by this means and Malta impregnable. It has often been noted what a limited amount of damage the French can inflict on us, if only they are prevented from passing the Straits of Gibraltar.[1] They can only destroy our local trade in the Mediterranean, and make attacks on Malta, Cyprus,[2] or Egypt. But this would be a waste of energy, and would have no strategic advantage. If we can ensure the safety of our base, and can assume the offensive with our torpedo craft, the battle-ships can hold the entrance and can reinforce our fleets in the open sea of the Atlantic until the time comes when a return to the Mediterranean will be less hazardous than on the outbreak of hostilities. In the meanwhile, cruisers, running from Gibraltar as a base, would harass French trade with Northern Africa, as far as this could be done without undue risk. A few sub-divisions of destroyers should watch the Eastern end of the Mediterranean, if Russia formed one of the coalition, and should be able to reduce the Black Sea Fleet by a ship or two. The French Mediterranean Fleet would be bound to put to sea with the intention of combining with their Atlantic Fleet or with the Russian Fleet. In the latter case it might be an advantage if the junction was successful, for when our destroyers have minimised the danger of the

[1] The strategic importance of Gibraltar since the treaty of Utrecht has never been greater than at the present day.

[2] If used as a base for destroyers and submarine boats.

torpedo attack the squadrons would know where to find the enemy. The Mediterranean and Channel Squadrons are a homogeneous force, which has learned to work in combination from the manœuvres of the last few years. They should then be a match for the French and Russian Mediterranean Fleets. If the French Mediterranean Fleet passed Gibraltar it would still have to evade the patrols of our Mediterranean Squadron off the entrance. These would be in wireless touch with the Channel Squadron,[1] which in turn would be in touch

with the Home Fleet. This, again, would be in wireless touch with England, and telegraphic communication would be kept with the cordon of armoured cruisers off the north of Scotland, assisted by their division of destroyers from the east coast. It is erroneous to suppose that this cannot be done. It is true that our wireless installation

[1] See wireless telegraphy chart.

needs great improvements before it can be of real use for war purposes, and this has been shown by the recent manœuvres. But the results in the Navy may be due to the fact that operators of Marconi instruments do not receive very high training. Mr. Marconi has just carried out successful experiments with Captain Jackson, of H.M.S. "Duncan," in keeping touch with the power station at Poldhu from England to Gibraltar. Success had already been attained by Mr. Marconi in the similar trial of a wireless installation from an Italian war-ship.

III.—The East.

In the East the need for submarines is not so pressing, except for the defence of our bases. The French have at present no anticipation of employing submarines in this quarter, but confess that they need more torpedo-boats. Open sea warfare is likely to be prominent in these waters, and fast units will make raids on unsuspecting colonies, on isolated commerce, and on convoys. But from Russia, and from a combination of Russia and France, we have more to fear. Russia now possesses overland communications for strategic purposes, versus Great Britain's oversea route, and by the completion of the Siberian Railway Port Arthur has become the most formidable fortress in the East. The Journal of the R.U.S.I. for August, 1902, had an extract from a Russian paper dealing with the defence of Port Arthur and Vladivostok. "Large numbers of swift torpedo-boats might, to some extent, suffice for the protection of the forts. Submarines might be an advantage to the defence. These should be stationed at Vladivostok, the Bay of America, and Posiet Gulf, on the one side, and at Port Arthur on the other. They would have to be fairly numerous to allow for detaching some. The Gulf of Peter the Great and the Bay of St. Olga are the only points where there is much likelihood of a landing being attempted. The latter could, if necessary, be safely left to submarines to defend. A movable station could be constructed for them, which in two or three days could be transferred to any point where they were needed, thus setting the ordinary fleet at liberty to operate at sea. Their sphere of action being necessarily limited, they would have to be supplemented by torpedo-boats as scouts at suitable points." This extract illustrates that the use of submarine boats, aided by torpedo-boats, for defensive purposes is recognised by foreign nations as supplementing the functions of a fleet of battle-ships, and indicates what our Navy may expect to meet in the East. It is therefore welcome news to read that admirals in the East are alive to the dangerous demonstrations of Admiral Alexeieff. The China, Australian, and East Indian Squadrons will, it is hoped, be able to effect such a rapid concentration in future that Russia must take into account the unity of the three as a determining factor in the Eastern waters. With the Red Sea and the Straits of Malacca blocked, the China and Australian[1] Squadrons can concentrate for offensive measures. This combined fleet will further increase Russia's disadvantage in having sea frontiers in three distinct parts of the world, and in being unable to send battle-ships overland.

Now the Kusubo Canal has been dredged out, Japanese torpedo craft can pass through and command the channel on either side of Tsu-

[1] Australia should develop a submarine-boat defence, for protection of her shores in absence of Australian Squadron.

shima Island; to the extreme North their port, Wakanai, commands the Russian station of Konsakoff, and Pescador (Bako) controls all approach from the southward. By a glance at the Chart[1] it is clearly seen how well these waters lend themselves to a complete torpedo craft blockade of Port Arthur and Vladivostok; this would entirely prevent junction of the Russian ships stationed at those ports. We learn from a Japanese naval officer that submarines will figure in their next estimates.

The Needs of Future Warfare.

Having thus applied our principles, we will consider a few methods necessary to secure our objects, such as defence against submarines, protection from torpedoes, and the necessity for high speeds.

I.—Protection Against Submarines.

Stress has been laid throughout this essay on the value of the submarine within limitations, and we have touched on the risk of a torpedo attack. We may now enter on proposals to obviate these dangers. Modern submarines are almost self-contained, and have a fair radius of action, which can be increased by towing behind merchant-vessels or war-ships. They then could be dropped off an enemy's port, and would be fresh for work, having their batteries charged ready for action, and being full up with gasoline.[2] Their mechanism is quite simple, and if kept in an efficient state should give little trouble. With a well-trained crew long distances can be covered awash on the surface, or totally submerged. We think that in the diagram of the "Holland" boat running submerged the periscope would offer an exceedingly small target, and when this is down, or the boat running deep steered by compass, where is the target? Admiral Makaroff, of the Russian Navy, has invented a submerged microphone, which is supposed to indicate the whereabouts of torpedo craft or submarines. This is no new idea. Microphones have been used for many years in informing the defence of the approach of attacking boats. Unfortunately it gives no idea of direction, distance, or depth—three rather useful factors. We may say, without much fear of contradiction, that the defending ship would suffer severe nerve tension if the approach of an invisible enemy was known, and that the knowledge hardly contributes to defensive measures. The hydroscope, by which submerged vessels are to be located by sight, needs scarcely any comment. It is extremely difficult in a submarine running submerged to see more than a few yards even in clear water, and it is unlikely that the instrument will ever be developed sufficiently to be of much value, so as to enable a surface vessel to observe a submarine under water. For the same reason, the proposal to sight submarines from balloons has proved indifferent when experiments have been carried out.

The chief defects of present submarines as offensive weapons are:—

1. Low speed.
2. Comparatively small radius of action.
3. Limited range of vision.
4. Enervating effect on crews.

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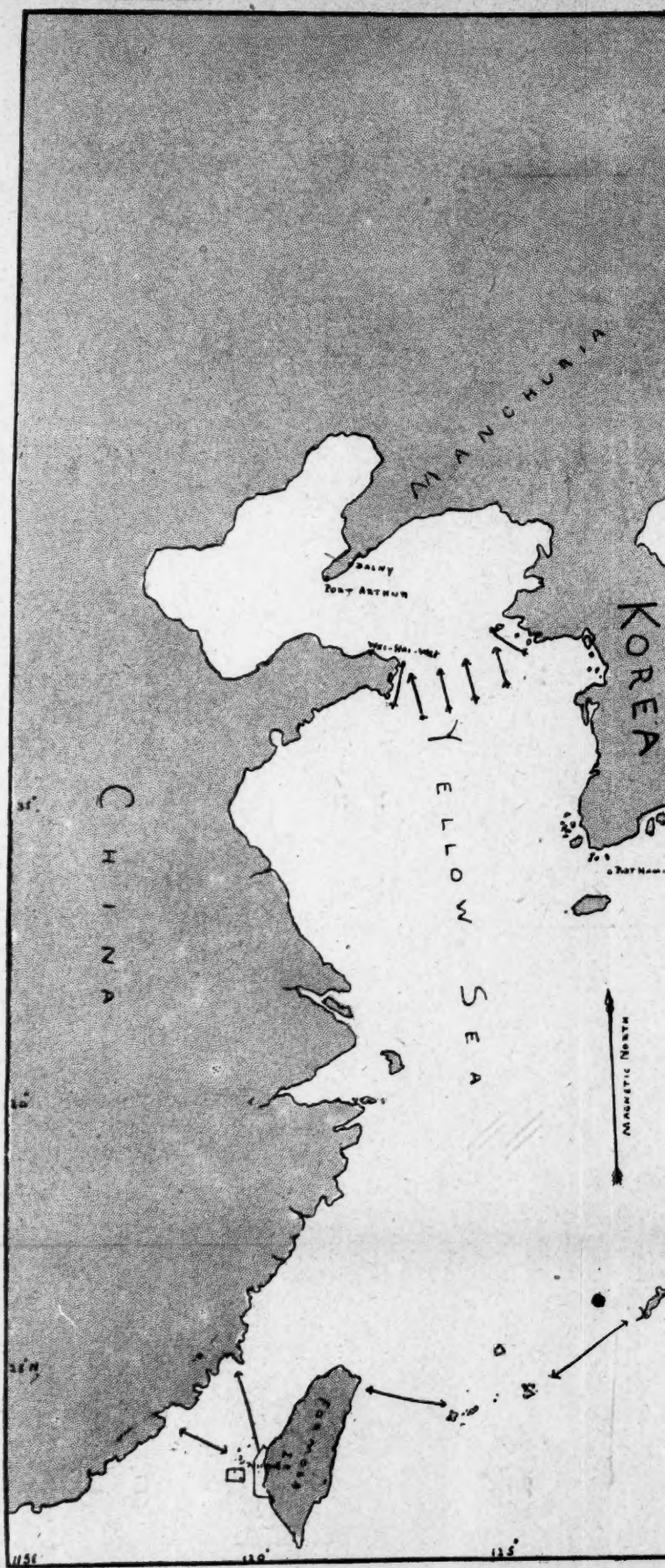
[1] See Japanese torpedo craft strategic chart, plate 6.

[2] This refers to the "Holland" submarine boat.



J. J. K. & Co., Limited, London.

KOREA
SEA OF JAPAN
JAPAN
MAGNETIC NORTH
LIGHT-HOUSES
TORPEDO CRAFT
130°
135°
140°

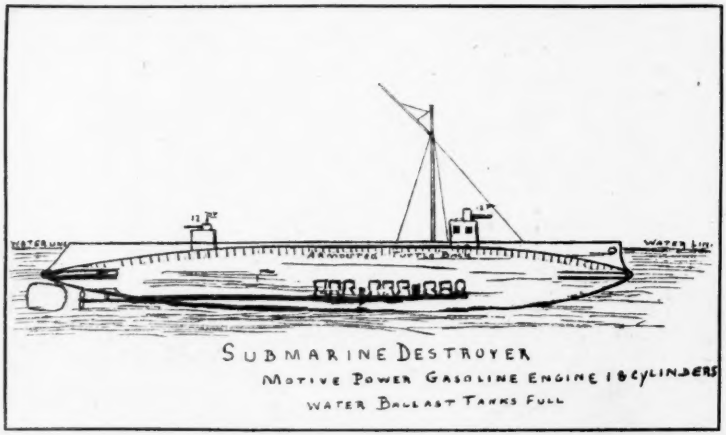
We may assume that these defects are not likely to be remedied entirely, but improvements may be expected. The destroyer is the development of the first torpedo-boat, and similarly fast submarines will probably emerge from the embryo type.

Admiral Aube advised that submarines should be carried on board ship, and dropped at the psychological moment. Experience has, however, shown that this was not very successful in the case of torpedo-boats. The "Hecla" was the first depôt-ship in our Navy. Built originally for the merchant marine, she carried ten second-class boats in crutches on her superstructure, and was able to hoist them out in a moderate sea-way. After her came the "Vulcan," which was built in 1889, and is a well armed cruiser with a speed of about 18 knots. She carries six second-class boats 60 feet long, with a speed of 16 knots, and has powerful hydraulic cranes and derricks. In 1895 the French built the "Foudre," which is also a well-armed cruiser of 18·5 knots. She carried at first ten aluminium second-class boats, having a speed of 16 knots, but the aluminium hulls of these boats were not a success, and this metal was afterwards replaced by steel. She resembled the "Vulcan" in carrying powerful cranes. Since these types have not been repeated in recent years it may be argued that they have never been considered a very great success. The increased weight of the submarine over the torpedo-boat makes it doubtful if submarines will ever be carried afloat—certainly not until electric storage batteries can be dispensed with and the design made very much lighter than at present.

These reflections show that there is at present truth in the English view of the submarine as the weapon of feeble Powers. The line, however, between offence and defence is hard to draw, and it is possible that ships may be compelled to come within the sphere of influence of defending submarines. Hence we may ask What means of protection can be suggested against such a danger? Various proposals have been put forward. It has been said that a submarine can be easily destroyed by a battle-ship with quick-firing guns. In this case it is assumed that a submarine must always come to the surface to take bearings, and must be exposed to gunfire, if only for a few minutes. But this is unnecessary in the modern type of submarines. The approved antidote to the submarine is a spar with a gun-cotton charge at the end. This is attached to the quarter of a destroyer, which chases the enemy, as soon as the latter is visible. The spar is swung out, and when over the submarine it is detonated. Experiments with the spar torpedo are reported as being quite successful—when the submarine is seen! The Americans placed live animals in a submerged tank, and exploded charges at various distances. The animals were quite unhurt. An experiment, it is reported, was made recently at Cherbourg with a slightly different object. It had been said that a submarine could not fire a torpedo at a short range, because the risk of suffering in the explosion would be too great. Several sheep were placed in the "Naïade," which was under water, and torpedoes were exploded at different distances. Since the sheep were not hurt, officers took their places, but the explosions had no effect beyond increasing the pressure on the hull.

An admiral recently said: "We want howitzers firing shell at an elevated trajectory, which will explode at a given depth beneath the water." It is as yet impossible, however, to destroy a submarine by an explosion produced under water from gunfire. Up to the present we

do not possess a single gun which can send a projectile any distance under water. When a projectile strikes the water its nose is thrown up on impact. The base of the projectile dips in lower, but scarcely more than a foot or two before ricochet occurs. A lucky shot might carry away the periscope and prevent observations, but can do no damage to the boat's power of manœuvring under water. It is often thought that the excess of speed possessed by a battle-ship or other surface vessel would ensure evasion. This may be so on the assumption that the presence of the enemy was apparent; but what if a fleet came within the meshes of a careful submarine boat plan? We have only to imagine the plight of a single ship within a triangle formed by three submarines with periscopes at most visible. Speed will not be of much avail, and a short time would place the ship out of action for all practical war purposes.



Good as the torpedo destroyer is, it is doubtful if this type is adapted for the new task of destroying submarines, because:— 1. It has a large turning circle. 2. It offers a large target both to the surface and sub-surface vessels. 3. It is easily put out of action by gunfire, and the crew are unprotected. The destruction of submarines must be a waiting game, and they will be caught only when they come to the surface through any of the following causes:—

1. Entanglements by nets or hawsers, or injury from a gun-cotton charge.
2. Exhaustion of electric batteries.
3. Defects to internal mechanism.
4. Defects to external gear of diving rudders, and the like.
5. Bad fumes, producing the collapse, or partial collapse, of the crew.
6. If the periscope is shot away, a porpoise-like rise and dive may be necessary for obtaining a bearing.

The submarine destroyer should therefore possess a high speed to enable her to avoid cruisers. It is thought that she should be designed

to offer a small target, as it may be necessary to work in the vicinity of an enemy's fortified port in seeking hostile submarines. A small target is also necessary to enable a destroyer to escape easy detection by submarines. The design of the modern submarine presents a line of thought as to the best form which a submarine destroyer should take. Admiral Henderson recently said in a lecture that the present shape of ships is likely to be stereotyped. But it cannot be doubted that, when the results of sub-surface navigation are better known, the present theories of construction may undergo a change. The following is a suggestion in the present case:—The submarine destroyer should be a large surface boat capable of altering her trim by taking in water ballast, so as to lessen the target exposed to the enemy. The upper works should have a turtle-back shape, and armoured, which will cause projectiles to glance off. Navigation should be from a conning tower having an all-round vision, and funnels[1] should be abaft the conning tower. The conning tower would, of course, have to be armoured. The upper portions of the funnels would be made telescopic, for use when travelling at high rates of speed. A mast would also have to be carried for wireless telegraphy aerial wire to be hoisted to. The construction of submarine boats would be copied in many ways, and the water tanks for lowering trim would also act as water or compressed air protection against a torpedo launched at her from a submarine. Her armament would consist of two 12-pounders and four 18-inch torpedo tubes.

II.—Protection Against the Explosion of a Torpedo.

Such are the methods which may be suggested as best suited for fighting against submarine boats. But it is not to be expected that ships will be able to avoid torpedoes any more than they can avoid being struck by projectiles. In short, we want ships constructed with some protection against torpedo attack. Means must be taken to minimise the damage which may be caused by explosion of a torpedo some ten or twelve feet below the water-line. The writer begs to leave armour, guns, accuracy of gunfire, and similar questions to abler hands, but he cannot help remarking that it would seem they receive so much attention from hosts of naval writers and would-be experts, that there is a real and serious danger in neglecting to consider how to minimise the effect of weapons of much more deadly potency than any gun ever constructed.

The modern battle-ship expends quite 30 per cent. of her displacement in armour to protect her from gunfire, but the minimum fraction is devoted to defence against torpedoes. A torpedo under present conditions would destroy a very large percentage of ships struck by it, and it would appear that naval architects are not following the teaching of modern science. Perhaps the lessons learnt from the "Belleisle" may have influence. The "Majestic" pounded the "Belleisle" at short range for twelve minutes or so. If a crew had been on board even during such a severe handling the actual water-line hits might with some difficulty have been plugged, and little damage have been done to affect the stability. The reason of her settling down on the shoal off Chichester is said to have been due to water coming in from a few water-line hits plus the water pumped into

[1] Oil motors would dispense with funnels.

her through all her fire-pumps to guard against fire. There was no outlet for this latter. If we compare this with the damage done by the explosion of a torpedo the advantage is plainly with the torpedo. The "Belleisle" collapsed under one explosion of the latter; it would appear that the effect outran all anticipations. The difficulty of salvage was certainly unexpected. Although the immediate object of the test was not realised, important data must have been given as to the destructive effect of a torpedo, as, from Press reports, we learn one-sixth of the ship was destroyed, a section of which had been specially strengthened from the bow to the citadel and across to the boiler-room, but the whole portion was so wrecked that divers could not enter.

The extreme accuracy of the modern Whitehead torpedo fitted with gyroscope, or Obry apparatus, renders a change in construction necessary, and this is shown by the recognition of its increased range. Most critics quote 2,000 yards as the minimum distance for battle squadron actions. The British Navy now has a 3,000-yard torpedo; it is natural to expect that this will be still further increased, and recently there was a report that the Austrian Government is experimenting with a new invention which brings the range of the torpedo up to 3,800 yards. It should be remembered that all nations have adopted the gyroscope for their locomotive torpedoes, and have turned a somewhat erratic weapon into a reliable engine of war, whose influence is more and more attracting notice as the chief and most deadly weapon of modern warfare. This increase of range and of accuracy cannot be too strongly emphasised. Search-lights carried by most ships are of little use outside a 2,000-yards range, and even at this distance the ray can generally be passed through in safety. It is extremely unlikely that a destroyer would be picked up outside this limit, and even if she discharged her torpedo as soon as observed, the torpedo would have a fair chance of hitting, particularly if there were several ships in company.

The problem is to design a torpedo-proof ship. We have seen the "Dominion" developed from the "Warrior," the "Libertad" from the "Huascar," but naval architects have not yet produced a torpedo-protected ship. The only attempt is the crude torpedo bulkhead, as constructed in the Russian battle-ship "Tsarevitch," and in some French battle-ships. Designers in foreign Navies have had the idea of armouring the ship below the water-line as a protection, but this plan has been abandoned, and it is known that rigid armour plates with many butting joints and armour bolts are no defence against the shattering effect of a torpedo. The ductility of lead has received attention, and lead envelopes in the compartments have been suggested; they might be useful if we did not have a better proposal.

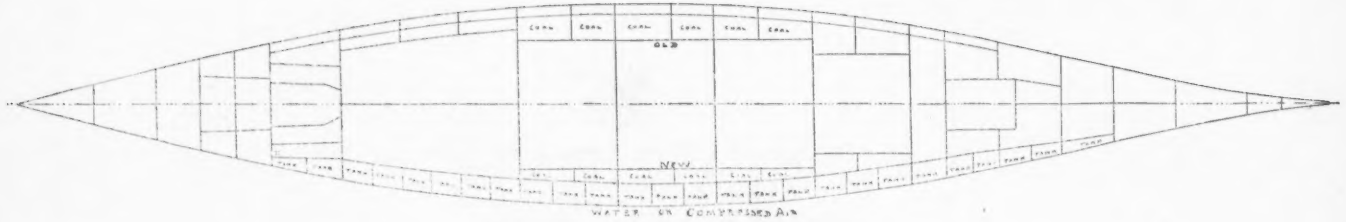
It was thought that American cornpith cellulose, if placed behind a plate, would swell on contact with the water, and thus fill up the hole and stop the inrush of water. It is hardly surprising to learn that the cellulose was sent into the air before it had time to get wet. The idea that coal in a bunker would stop the effect of an explosion is equally unsound, because loose coal would suffer the same fate as the cellulose. A hanging net defence is useful for a ship at anchor, and if not very effective against modern net cutters, gives the crew a feeling of security which might be useful in increasing the efficiency of night gunfire, and in lessening the strain of long watches. Nets are

of little use for ships under way, unless they are prepared to steam at very slow speeds.

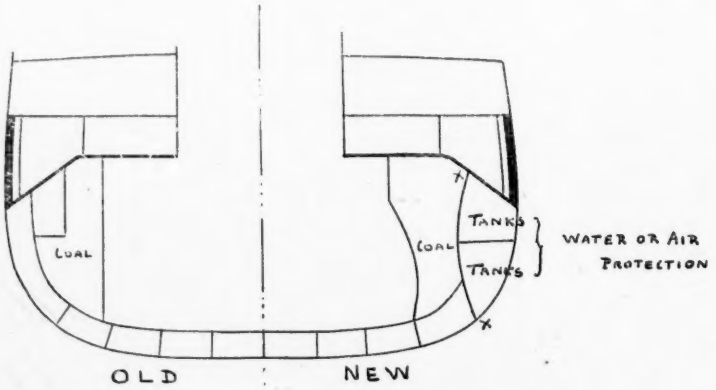
It has long been recognised that a cushion of water or compressed air are the best agents for minimising the explosive effect. It may be said that there are no really reliable methods. Future designs should allow for ships having water or compressed air protection. By a greater system of cellular division, and by increased rapid flooding arrangements, with corresponding pumping facilities, it is thought that injuries from torpedo or ram might be minimised so as not to be so disastrous as in the cases to which we shall refer. All compartments would be flooded, and subjected to a severer water pressure test before launching than that now customary. Each compartment should be tested like a tank to resist a water pressure varying from 40 lbs. to 50 lbs. on square inch, without undue weeping of rivets. We show a rough drawing of a battle-ship from "Brassey's Naval Annual" for 1903. If the design allowed for spaces xx[1] over the vital parts being filled with water or compressed air when in the vicinity of a coast where danger from submarines or torpedo-boats may be expected, the ship would then suffer the minimum damage by a successful torpedo attack. Ordinarily the compartments would be left empty. The ship would then have a higher freeboard and a higher gun platform for fighting in the open sea. A saving of weight might be obtained by doing away with ammunition passages, water-tight doors and fittings, substituting a tank system of cellular compartments, any one of which could be flooded easily and rapidly, or filled with compressed air by air compressors. The interior of a ship having such a tank system should be built in the form of an internal ship, quite ten to fifteen feet from the outer skin, so that the inner skin could not more than slightly be pierced by an explosion. The amount of the water cushion or compressed air protection round the sides of a ship would, of course, have to be calculated so as to allow of a maximum space outside the engines and magazines. The diagram of the tank design for battle-ships will show that a considerable water or compressed air protection could be carried. Private enterprise cannot undertake explosive experiments. It seems that compressed air would minimise the effect of a torpedo explosion below the water-line more than anything else, as a large volume of air would escape when a fracture occurred and partly counteract the explosive effect It might be difficult to make the tanks air-tight, and would slightly increase the cost of construction for extra caulking, etc. The air compressors could always be kept going in dangerous waters, and a sufficient pressure maintained in the tanks to be of great service; this would offer no great difficulties, as the ballast tanks of a "Holland" submarine frequently retain air pressure for a considerable time to counteract leaks from a faulty Kingston valve or leaky rivet.

It is also difficult to foretell the value of a cushion of water without exhaustive trials. In this case, if water is present and helping the outer shell, should this plating be shattered, only the particular compartment or the adjoining one damaged, there would be no change in water-line, and if a serious leak did occur other tanks could be pumped out, thus lightening the ship.

The rearranging of bulkheads and sub-divisions, shown in the sketches, should make a ship almost unsinkable against a torpedo attack, because whatever damage is done the inrush of water is so much located.



SUGGESTED TANK SYSTEM OF PROTECTION.



Whatever material might be introduced in the spaces, the most important feature is the sub-division into a tank system with a water or air service, pumping facilities, etc., well developed, and under perfect control.

It may be remembered that the French submersible "Narval" is constructed on the principle that a freely circulating body of water between the inner and outer shell is the best protection against an

"NARVAL"

explosion caused by a torpedo in vicinity of boat. The writer has no data from which elaborate figures could be given. If we take a battle-ship with a water-plane area of 24,000 square feet:—

$$W = \frac{A}{12} \div 35 \qquad A = \text{water plane area, 35 cubic feet of salt water weigh 1 ton.}$$

$$= \frac{A}{420} \qquad W = \text{weight necessary to sink ship 1 inch.}$$

$$W = \frac{24{,}000}{420}$$

$$= 57{\cdot}1 \text{ tons.}$$

$\therefore$ 57·1 tons would sink ship 1 inch.

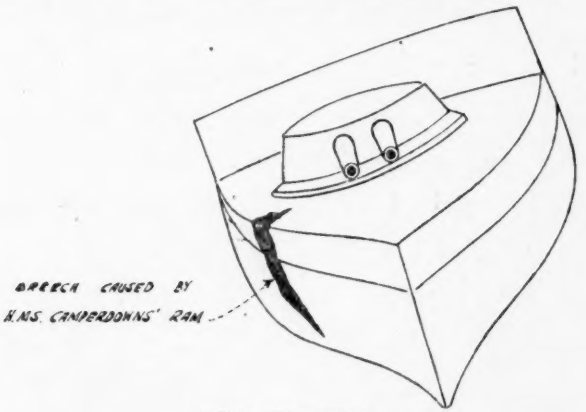
(Change of area may be neglected for 2 feet at water-line.)

$\therefore$ to sink ship 2 feet, 57·1 $\times$ 24 weight of water would have to be taken in.

$\therefore$ 1,370 tons are available as water ballast.

These figures are entirely approximate, and are intended to show merely that a considerable water protection could be given by slight immersion. A curve of tons per inch immersion for any ship would at once show this. On any injury to the hull of the ship below the water-line, a compensating compartment at the opposite end and side of the ship would be instantly flooded. Longitudinal trim would be kept as level as possible. The reserve of buoyancy would be drawn upon, but owing to the present favour of high free-board ships this reserve in modern architecture is very considerable, and far in excess of Board of Trade requirements. The reserve of buoyancy in modern battle-ships works out to approximately 90 per cent. of the total buoyancy of the ship, and even in old, low free-board ships it was something like 50 per cent.

The lessons taught by submarine work show how enormous volumes of water can be taken in to reduce buoyancy, and if this volume is suitably controlled there is no reason why naval architects should not employ it to compensate for injuries received from ram or torpedo.[1] Two diagrams are taken from "Ironclads in Action" to illustrate the point under consideration. The first shows the aperture made in the "Victoria" by the "Camperdown's" ram; the second gives the injury inflicted by a torpedo on the "Aquidaban" in the Brazilian Civil War, 15th April, 1894. An allusion may also be made to the "Prince George," recently damaged by the ram of the "Hannibal." A hole in the port side in the after submerged flat was made, and this compartment rapidly filled. By shifting of weights and admirable seamanship a more serious catastrophe was avoided. If this vessel had been constructed on the water or air-tight tank principle advocated in this



H.M.S. "VICTORIA."

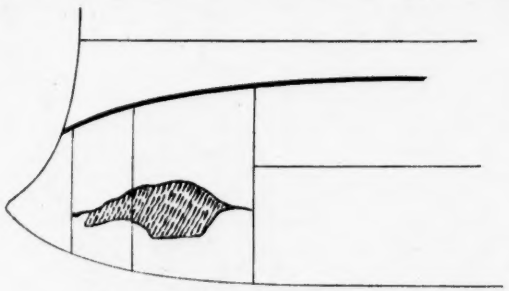
If a Compensating Compartment at after end of ship portside had been at once thrown open to the sea, an excessive inclination would have been prevented, enabling all boats to be hoisted out, before the ship was abandoned.

paper, a few tanks would have been pierced, an emergency Kingston door would have at once thrown open in a tank on the starboard side abreast of the position of the now existing fore submerged flat. Scarcely an inclination would have resulted. Stability, both transverse and longitudinal, would have been assured. A slight increase of draught would have followed, but this would not impair fighting efficiency. The places allotted by modern construction to submerged torpedo-rooms are far too spacious. In the American "Holland" boat a large Whitehead torpedo is adequately manipulated through a six-foot hatch. A detailed discussion of proposed alterations would be of a confidential nature, but it suffices to mention that with the new form of quick-loading torpedo tube now under consideration for the British Navy, modifi-

[1] Compartments and wings can now be flooded through a water system controlled by small Kingston valves; these, it is considered, are not rapid enough for compensating purposes to prevent excessive inclination.

cations will be introduced, we hope, in the construction of these compartments, and no doubt they will be more extensively sub-divided.

Battle-ships and cruisers, then, should be modified and split up into cellular compartments. The centre of gravity of each cellular space can be calculated from the designs, and if several compartments on one side of the ship were injured and filled with water, their opposite compensating compartments would be brought into use, and there would still be an ample margin of buoyancy. If large emergency Kingston doors were fitted so that abundant volumes of water could at once be let into special compartments to compensate, an even keel would be maintained. Experience teaches that it takes some considerable time to bring a submarine from surface running condition to awash condition ready for diving, even when all Kingstons are thrown open to the sea simultaneously. However large an injury were made, an even keel could be kept if the compensating compartments were at once flooded. It is thought that no communication should be allowed from one compartment to another, except through manholes (not doors), which can be closed with great rapidity from below and on deck. If doors cannot be eliminated there should be as few as possible, and nearly all communication should be from the upper deck, for every



"AQUIDABAN," INJURY BY TORPEDO.

door and hole in a water-tight bulkhead is a grave weakness. Fire mains, electric wires, and steam pipes are indiscriminately run through bulkheads, and are often not quite water-tight. All barbettes and similar parts of the ship should be made more water-tight than at present.

We have developed our horizontal internal organisation through water-tight doors so thoroughly that there is no doubt that a more vertical system of ammunition supply and personal convenience might with care and thought be made as efficient. Huge magazine passages and enormous water-tight doors capable of allowing ammunition trollies to pass abreast are quite unnecessary, and add very much to dangers from injuries below the water-line.

It is worth noting that the North German Lloyd steamer "Kronprinz Wilhelm" has Doepp's Patent Hydraulic apparatus for the simultaneous and instant closing of water-tight doors. When the doors are to be shut electric warning bells are sounded in every doorway for thirty seconds, and fifteen seconds later, by a turn or two of a small wheel on the bridge, the doors are closed. These are indicated by an

electric light appearing on a plan kept on the bridge showing each place where closed doors exist.

In still further studying the tank system of water or compressed air protection, we find another use for the tanks. They can be made to carry liquid fuel. We have already noted that coal in bunkers is of very slight value as a protection. Liquid fuel will make an efficient protection in minimising the injury received from a torpedo, and will be a satisfactory substitute for coal as regards propulsion. When the tanks are empty of oil they can be compensated by the admission of water. A diagram is given of the storage of liquid fuel in ordinary cargo steamers on the Flannery-Boyd system.

The German Imperial yacht "Hohenzollern" has several boilers fitted for oil fuel. Two of our Channel Squadron battle-ships were recently fitted for experiments, but the results have not yet been made public. The want of oil supply stations abroad has hitherto been a hindrance, but large depôts have been established for the use of the mercantile marine, and it is now said that oil fuel in bulk can be procured from London to the East. The sources of supply are Borneo (crude), Caucasus (residue), Burmah (residue), and Texas (crude). If the use of liquid fuel became more universal flying bases for coaling stations would be unnecessary, as liquid fuel could be taken in whilst towing the oil-steamer. This can be done in all but the roughest of weathers.

III.—Need of More Prime Movers.

Having examined the fundamental necessity of torpedo protection in ships, we may proceed to consider the next important factor—speed. The need of homogeneity and speed in battle squadrons is recognised, and improvements can only be looked for in perfecting present methods. It will be apparent, from what we have said of the duties of our smaller vessels, that there must be no diminution in trying to attain the highest speed for cruisers and torpedo craft. The smaller type of protected cruisers would at all times do scouting duties for a fleet, and could do useful work in watching in the vicinity of the enemy, or acting as intermediate stations for wireless telegraphy. Torpedo-gunboats with good speed can be invaluable for escorting sea-going torpedo-boats or small torpedo-boats. For purposes of search the gun-boat cannot be beaten, while in bad weather the range of vision of torpedo craft is somewhat limited. When the enemy is sighted the gun-boats can decline a torpedo attack, and leave this for her sub-division of torpedo-boats to press home. The British Admiralty having recognised the weakness of the destroyer class working in heavy seas have recently had designs of an improved type submitted from private shipbuilding firms. Four of this new "Scout" class are to be laid down during the financial year 1902-1903 and four in the next year. When the original destroyers were designed it was considered that they were especially adapted for more extended operations at sea than the first-class torpedo-boat. But experience and the change in the aspect of naval warfare demand a more seaworthy type. The ship which is being built at Vickers's yard is the largest, and may, as a result, be the most seaworthy. Her displacement is 2,900 tons. To realise 25 knots her machinery has to develop 17,000-I.H.P. The Fairfield ship is the smallest, being 2,545 tons. The ship at Armstrong's is 2,750, and Laird's design

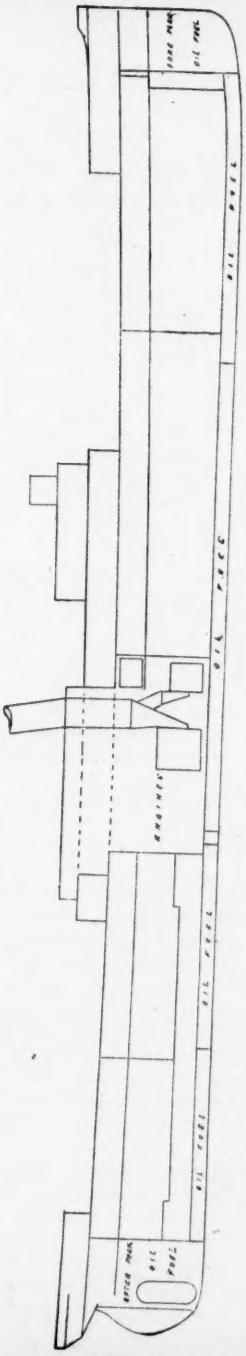


DIAGRAM OF THE STORAGE OF LIQUID FUEL IN ORDINARY CARGO-STEAMERS ON THE FLANNERY-BOYD SYSTEM.

is 2,610 tons. The three last-mentioned all have engines of 16,000-I.H.P. The comparative results of speed will be interesting.[1] It will be seen that the faith in the destroyer is still strong. The weakness and liability to buckle under a severe strain has been remedied by stiffening, but it is clear that future boats will need special attention. The number of these vessels now amounts to 130, and 15 more are ordered for 1903-1904. A modified design accompanying a somewhat lower speed is the idea favoured at present. The boats are to be only of 25½ knots speed, as compared with 30 knots in the preceding vessels.

While torpedo-boats, having a limited range, which is restricted to a question of daylight and of coal supply, can only work from a base or parent ship, the destroyer class can act as sea-going torpedo-boats and as torpedo-boat destroyers. The torpedo armament of these ships, as of the "Scout" class and of torpedo-gunboats, is of the most vital importance. It gives them a very fair chance of success in attacking anything afloat. The torpedo is the only weapon that allows a comparatively small craft to face the most formidable vessel afloat, and the advantage in a surprise rests with the smaller craft.

The question of speed and endurance becomes of great moment. These smaller vessels will be of great utility in dealing with the enemy's surface and under-surface torpedo craft. Though the importance of speed is well known, there are many ways in which improvements and economies can be effected by studying the methods employed outside the Navy. The value of electricity, oil, and so forth, must be more largely recognised. Electricity cannot displace steam as a prime mover. The mechanical efficiency is high, but the weight is a fatal objection, so far as ships are concerned. But the power may be utilised for other purposes than propulsion, and the writer thinks that this is often overlooked. For all short hoists, ash hoists, ventilating fans, feed pumps, air compressors, forced and induced draught fans, electric bollards for coaling purposes, and the numerous small engines usually classed as auxiliary machinery, there can be no better system than an extended use f electric motors, which also obviate the necessity for long lengths of steam pipes and large holes in bulkheads.

Marine engineers have recourse to other systems of prime movers, such as the steam turbine, in which there has of late been a marked improvement; the loss of steam escaping between fixed and moving blades is constant, irrespective of the power developed; this makes the turbine more useful at high speeds, and it is not so economical at low speeds. The multiple expansion system in Parsons' turbine has partly overcome this. Further, the turbine can be run in one direction only, and no very successful method of reversibility has yet been found. Hence it is necessary to fix separate turbines for going astern. If it were necessary to have these latter equal in power to those for going ahead, the additional weight would be an objection, but it is thought sufficient to have them only one-third of the power of the turbines for going ahead.

Two British destroyers, the "Velox" and "Eden," have been constructed on the turbine principle, and recently a third-class cruiser has been launched which will be fitted with two sets of turbines, one

[1] If a combination of oil and coal fuel could have been arranged for, the now rather limited range of action of these "Scouts" would have been extended advantageously.

for high speed and one for cruising at low speed, the latter replacing, as in the "Eden," the subsidiary reciprocating engines, which until now have been regarded as necessary for low speeds. It is anticipated the "Amethyst" will attain 23 knots an hour.

Next to the turbine comes the use of the oil motor, in which enormous progress has been made. There are great mechanical advantages to be gained from the use of any oil or petrol engines[1] on board a ship. There would be no need for boilers, steam pipes, or funnels, and few stokers would be required. The oil supply tanks would be entirely in the double bottoms and wings of a ship, and therefore well under protection. It is clear that economy of fuel space, the decrease in the number of stokers required, steady and constant steaming power of boilers, are advantages desirable in a war-ship, and nowhere so much as in torpedo craft.

The principal trouble is to obtain reversibility. The reversing is commonly done by clutch devices in the machinery, and in some cases reversible propellers are used, though these are not suited for large ships. The oil turbine would reduce the weight and space further, but the difficulty of reversibility is here present.

In the choice of prime movers, the needs and conditions of use must be considered. In naval ships weight is of more importance than economy. The weight of steam turbines in destroyers is 7 lbs. per I.H.P. This is a saving of 100 per cent. Oil engines are heavier, but with more experience there is every prospect of a further reduction in weight. The fuel consumption of oil would be less in quantity than of coal, but it would cost more, and only where weight is of great importance can oil be used, unless there is to be a great fall in the price of oil. But reduced weight in machinery and fuel is most desirable in high-speed ships. Every mile added to the speed per hour demands a much greater engine power. If we take ships of the same size and weight, the power required to get 25 knots is almost double that required for 23½ knots. Greater engine power means greater weight, and any machinery of reduced weight is valuable. For this reason it is important to persist in experimenting with other prime movers than coal.

It is well known how a large proportion of engine power is absorbed in unremunerative work. Something like half the power goes in the formation of useless waves. Experiments in forming hulls have reduced wave resistance, but the movement through the water at a great speed of a mass represented by a ship means the piling up of the water in waves, and it is this which necessitates the great increase of power required to add a little to the high speeds now reached.

The question of wave resistance and its relation to engine power needs further investigation, in view of the experience gained by subsurface architecture. Since the question bears on speed and economy of fuel, too much attention cannot be paid to it in designing our ships.[2]

[1] It is rumoured a 6,000-H.P. gas engine is being constructed for a Russian destroyer. No funnels, therefore less to be seen when watching off a port.

[2] Notes taken from a lecture by James McKechnie, Esq., Director, Vickers, Sons and Maxim, Town Hall, Barrow-in-Furness, 18th March, 1903.

Whether the recent electrical process for converting peat into coal will be valuable for maritime purposes remains to be proved. The handling of the briquettes would be far more convenient than that of ordinary patent fuel, and as it is practically smokeless it would have great advantages. Perhaps a combination of peat with oil absorbed in it would give a good calorific value for naval use, and could be easily obtained at our Atlantic bases of the future.

Concluding Remarks.

In conclusion, the writer would advance the idea that it is unwise to stifle discussions on modern strategical questions. It is far more important to consider where we are falling short than to flatter ourselves with vain hopes and to overlook our deficiencies. Sufficient attention has not been paid to the modern development of the Whitehead torpedo, or the possibilities of the submarine boat armed with it—weapons which must be largely used against us in the next naval war. In view of this the following outline of a war might be suggested. Operations may be concurrently carried on thus:—

1. Battle squadrons should take up the most advantageous strategic positions in the vicinity of their stations, and wait for an opportunity of engaging in more active operations at sea.
2. Shadowing cruisers in touch with the battle squadrons must watch the enemy's fleets or details.
3. Detached cruisers and destroyers must operate against the submarine bases of the enemy, and harass trade in addition.
4. Torpedo-boat destroyers, torpedo-gunboats, submarine destroyers, and submarine boats must act offensively against fleets and ships of enemy.
5. Minor squadrons must carry out aggressive operations against over-sea colonies.

The policy here advocated is but the logical conclusion of principles which are partially recognised. But while vague statements are plentiful, few attempts are made to grasp the whole problem. We are bound to confess that our naval policy must be changed. Whether it is to be a sudden change and a contradiction of past doctrines, or the next step in a series of changes, is only a matter of words. Since we do not like to believe that violent changes are possible in strategy, and since the future of the submarine may not realise the promise of the present, we may adopt, if we please, the second alternative. We can no longer say that the enemy's coast is our frontier, if we mean that we can make the enemy's coast-line the theatre of operations. And it seems almost presumptuous to call the sea our territory when we are debarred from the portion surrounding the enemy. It is true that the close blockade is gone for ever, but this need not upset the foundation of our naval policy. We have seen reason for doubting that a close blockade is an essential part of our traditional policy. It was only one phase. We must carry offensive warfare as near the enemy as we can approach. Instead of trying to keep an enemy in port, we must aim at preventing him from gaining the sea without our knowledge, whether *en masse* or in isolation.

When war has broken out, England must be prepared to act as aggressor. The means of effecting this varies from time to time, and from nation to nation. With us it was once a watch from Torbay, so that the enemy could be crushed at the first opportunity, or it was a rigid blockade of the hostile ports. Now it must be an ocean watch. The needs for this may be summed up:—

1. Speed—*i.e.*, the power of strategic movement.
2. Seaworthiness.
3. Endurance—*i.e.*, the power of remaining at sea independent of a port.
4. Comparative invulnerability from gun or torpedo.
5. Efficiency of signalling.

For battle-ships we must have speed, and homogeneous speed. The slow squadron has never yet been able to overtake the faster. Even one knot extra speed may mean a victory. And in tactics speed is of the highest value. The great commander of the future, as of the past will be the man who can secure the best position for his ships, and position depends on speed alone. And high-sea operations admit only the use of the fastest vessels. The day has gone when it could be proposed that slow, almost obsolete battle-ships might be of use in doing duty off a blockaded port.

Cruisers equally require the highest possible speed. They must be exercised much more than at present in keeping touch by whatever means they can. Long-distance signalling by day and night must be developed to the utmost, and greater attention must be devoted to wireless telegraphy. In the Spanish-American war the extraordinary vitality shown by torpedo craft in minor operations proves that speed is everything. The life of the torpedo-boat in daylight is greater than is commonly believed, and even in heavy fire, the boats, travelling at high speed, might get a torpedo attack home before they were totally disabled by gunfire. They certainly would have no difficulty when secondary armaments and small guns had been badly handled.

It may be objected that this plan, which embraces France as one of a coalition, has too much in common with the alarmists' forecasts. There is no doubt that France is falling behind as a naval Power. The wish to suspend battle-ship construction has gone forth, as if this was a luxury which France cannot afford. Fast cruisers and submarines for *la guerre de course* are less expensive. Further, the active service ratings of Mediterranean ships are reduced by 10 per cent. for the sake of economy. Thus it may be said that Russia and Germany are greater dangers at present. This is quite true, but the power of France in a combination must never be forgotten. Our remarks about submarines, though they are primarily concerned with France, may be generalised as applicable to any nation which may use these weapons in large numbers.[1]

France forgets that offence is the true defence, but she may contrive to inflict great damage. The French tendency to rely on the torpedo fails to satisfy good strategy. She may postpone defeat, but cannot easily win a victory. She is vulnerable in the West Indies, which, even if defended by submarines, must suffer if England can hold the Atlantic with battle squadrons. The function of our Army, after the Navy ensures the command of the sea, is to occupy the over-sea

[1] See table of foreign submarines.

territory of the enemy under the protection of our cruisers, which will keep the line of communication open.

The French plan of destroying our commerce, and of attacking vessels which are not war-ships must be considered. The controversy about the sinking of a ship of the British mercantile marine by a torpedo fired from a Japanese cruiser may be remembered. The "Kowshung" was hired for the conveyance of 1,100 troops from China to Korea. The Japanese gave four hours' warning. The British captain of the transport wished to give in, but the Chinese war mandarins threatened to shoot him. She was sunk with all hands by the Japanese. This case is brought to mind by the action of French submarines in exercising their crews, and appearing suddenly alongside their large mercantile steamers. The question naturally arises, Is a submarine to sink a transport carrying troops for over-sea operations by any nation with whom she may be at war? There is no chance of firing a gun across the bows. The submarine can wait for no courtesies of that humane nature. The speed of the transport may be 20 knots, and that of the submarine when running submerged may be 10 knots. Any delay would mean a lost opportunity. The transport is a public vessel of one of the belligerents, against which it is the right and duty of the naval officer to use force by every means not prohibited by International Law. A torpedo attack from a submarine upon a public vessel of the enemy is not prohibited. It is on the same level with sudden fire from a masked battery or from an ambush, and the sinking of such a ship is justifiable. But a sudden attack upon an enemy's[1] merchantmen not carrying munitions of war is on a very different footing. An officer's duty with regard to such ships is to capture them, not to destroy them unless they resist. Therefore, we contend that any nation which torpedoed the ordinary defenceless merchant-ship would infringe all the conventions of International Law by such a retrograde step to the manners of barbarism.

But in the heat of war International obligations are likely to be forgotten. In view of the declared intention of some nations to attack our mercantile marine by fast war-ships, having a retreat secured behind their lines of torpedo craft, the problem just discussed should excite interest, and may be taken as one instance out of the many difficulties which must arise when the full meaning of present conditions is appreciated.

As a final word, we may say that maritime warfare, without losing its essential nature, which demands an intimate knowledge of the sea, a high degree of fearlessness, and promptness in assuming the offensive is becoming more and more a matter of specialisation, skill, and efficiency. Peace preparations must include a study of ships, weapons, and of tactical and strategical problems. Inquiring into the relative value of the ram, torpedo, and gun must not be delayed till the hour of war. Any improvements in the torpedo will correspondingly depreciate the efficiency of the gun. It is necessary to watch developments which increase the radius of the torpedo, whether in a submerged or in a surface vessel, and to embody their influence in our future war-ships and in future strategy. There can be no impromptu providing of officers, men, or material in naval fighting, but each nation must rely on its resources amassed before war, and these resources must be adapted to meet any possible policy.

[1] Dr. Lawrence on International Law.

TABLE OF SUBMARINES.[1]

	No.	*Motive power when running.*
British submarines (submersible type), "Holland" type, launched the 2nd of November, 1901	1	Gasoline for surface, electricity submerged.
Improved "Holland" type launched early in 1902	4	Gasoline, electricity.
Larger "Holland" type launched 1902	4	,, ,,
Improved "Holland" type, building	9	,, ,,
Experimental boat, building French submersibles	1	
"Narval," 1897	1	Steam for surface, electricity submerged.
"Triton" type, 1900	4	,, ,, ,,
"Aigrette" type, building	13	,, ,, ,,
French automatous submarines (with thermo motors surface, and electrical motors when submerged)	X	One 2 Benzol motors, 2 electrical motors.
	Z	1 Heavy Oil motor, electrically.
"Naïade" type, built and building	20	Benzol motors, electric motor.
French automatous submarine (thermo motor only) building "Y"	1	Oil motor, with gas exhaust after compression when submerged.
Genuine submarine (using electricity only with accumulators)		
"Gymnôte," 1888	1	Electric motor of 55-H.P.
"Gustave Zédé," 1893	1	2 electric motors of 720-H.P.
"Morse," 1899	1	1 Motor of 350-H.P.
Improved "Morse"	2	,, ,,
"Lutin" type, 1899	4	,, ,,
United States "Holland" type	2	Gasoline for surface, electricity submerged.
Improved "Holland" type	6	
Experimental boat "Fulton" launched in 1901. "Protector"—a boat of "Lake" type under trial. Appropriation of £102,670 has been made (1903) for purchase of other submarine boats.		
Germany, being built by Krupp firm from drawings made by a Spanish officer	1	?
"Holland" type	1	Gasoline for surface, electricity submerged.
Russia, designed by a Russian engineer	1	Oil for surface, electricity submerged.
Austria	1	Experimental boat.

[1] Adapted from Table, *Nineteenth Century*, 1903.

THE ADMINISTRATION AND ORGANISATION OF THE ARMY IN INDIA.

By Major-General Sir EDWIN COLLEN, G.C.I.E., C.B., p.s.c.

Wednesday, 27th April, 1904.

Field-Marshal the Right Hon. F. S., EARL ROBERTS, V.C., K.G., K.P., G.C.B., O.M., G.C.S.I., G.C.I.E., etc., in the Chair.

WHEN I received the honour of an invitation from the Council of this Institution to deliver a lecture on the Administration and Organisation of the Army in India, I confess to many misgivings. The subject is a wide one, and there were sure to be many among my audience who were perfectly acquainted with it, and to whom I could convey no information that would be in any way new to them.

To appreciate what the Army of India is to-day, and the place it occupies in the system of Imperial defence, it is necessary to know how the Native Army was evolved from the races with which we came in contact, what they are, and what parts of India they occupy. But even a brief investigation of these matters would lead us into a field of study whose horizon is far away. Again, when we think of all the chapters in our military history in India, crowded with gallant deeds and picturesque and romantic incidents of war, the fascination of the subject naturally leads one towards that aspect of it. These are a few of the difficulties which presented themselves to me.

There are some things, however, which must always be borne in mind. We must recollect the vastness of the territory we call India, and its extraordinary diversity of country, its regions of mountains and hills, of undulating country, of far-stretching plains, immense forests, sandy wastes, and again of the most luxurious cultivation—a country through which great rivers, gathering in volume, roll down to the sea. If every kind of country is found in India, so we find great differences of climate, and hence remarkable differences in the inhabitants, from the strong and martial races of the north to the softer and less warlike southern races. Look at even the question of language. We may speak of Hindustani as the *lingua franca* of India, the language of the camp; but our soldiers are drawn from various peoples speaking divers languages. But there is much more than all this to think of, when we come to consider the composition and distribution of the Army. For we have to remember not merely the way in which we English gradually, step by step, took up the burden of Empire, but also the root and origin of the races we drew to ourselves in this great task; and above all, their religions, for the religious question is the foundation of all things in the East.

Let me invite your attention for a few moments to the chief geographical and racial divisions of India, with its 300 millions of inhabitants, beginning from the north, with its mass of mountainous country at the apex, and the great mountain barriers running from N.W. to S.E., and again to the S.W. The Punjab, the land of the five rivers, is the centre and focus of the northern region; and the Sikhs, the bravest of the brave, once possessing a splendid army, with which we had many a tough fight, are now to be reckoned among our staunchest soldiers. To that centre we have added outlying districts and frontier tribes. Many of its inhabitants are descendants of the fair-complexioned Aryans, who swept over India, or of the later Indo-Scythians, now professing the Sikh religion, a reformed and purified Hinduism, while considerable numbers are Mahomedans, the result of the Mogul invasion and occupation.

If we look in a S.E. direction we see the vast river plains of Hindustan and Bengal, whose teeming population is mainly Aryan, and from part of which we have in times past drawn the soldiers, the Brahmin and the Rajput, who helped us to conquer India.

Again, turning S. and W., we find the Maharashtra, the region of the Mahrattas, south of the Satpura Mountains, and comprising a large part of West and Central India, and part of the Deccan. This region is the home of a hardy race, the Mahrattas, not descended from the Aryans, but rather from the aboriginal tribes mixed with the Scythian invaders. The Mahrattas are Hindus, but they differ considerably from the inhabitants of the great river plains of Hindustan, and although they no longer give any large proportion of soldiers to our Army, once possessed a complete military system of their own, and even now form the centre of our military forces in that region.

And the fourth area is that broadly known as Southern India, or Madras, the home of the Dravidian stock, coming from the north in remote times. The people are largely Hindus, with an admixture of Mahomedans, and were the soldiers of Clive, and, later, of Wellesley, in our early wars.

Lastly, there is Burma, which is not India at all, for the people with Mongoloid characteristics, and professing the Buddhist religion, are entirely different from those of India.

To trace the rise and development of the Native Armies in India, and to show how from the very first the white officers and the white troops formed the nucleus on which these were founded, would not be possible in the time at my disposal; but it is necessary to know what was the origin of the presence of a part of the British Army in India, and how it came about that there were three separate Native Armies of India, and practically four at a later period, and what the conditions of their composition were.

Although there were "factories," as they were called, established by the East India Company at Surat, on the West Coast, and at Masulipatam, on the East Coast, the three principal bases from which all commercial and military enterprise sprang were Madras, Calcutta, and Bombay, in the seventeenth century. Sea power founded our Empire in India, military power developed and consolidated it, and the germs of that Army which has played such a great part in the extension of the Empire, not only in India itself, but in the Eastern world generally, are to be found in the small detachments of European soldiery sent out from England, or locally enrolled, for the protection of the modest establishments of the Company in the early days of

the settlement. Our forefathers were not very particular as to the material. The European soldiery were at first an extraordinary collection of all sorts and conditions; men whose country thought they would be better out of it than in it, deserters from the forces of foreign countries with which we were at war, seamen drafted from the ships, and Swiss and German mercenaries. It is refreshing to think of the early days, when six British companies could be sent out without the captains, as it was intended that the members of the Council of Government sitting at Calcutta should fill these posts. These were the instruments to be used, and if we are inclined to wonder at such material, let us not forget that it was wrought into shape by British officers, and that even in those days the regimental system and training enabled them to make disciplined soldiers of this collection of nondescripts. By degrees of course all this was improved, and organised regiments were sent out.

As to the Native Armies, they, too, gradually developed from the detachments of watchmen of the factories and forts, armed with spears and bows and arrows, until they were soldiers well trained after the European fashion, so that they even crossed bayonets with the white French troops. The three Native Armies of Bengal, Madras, and Bombay came into existence in this way from the three bases of operations, and separated by long distances by land or sea, they were naturally to a large extent independent and self-contained. The material was partly composed of the natives of the countries acquired or conquered, and partly recruited from beyond our territories, from the ranks of the roving bands of northern races, always ready to place their swords at the disposal of the highest bidder.

As Sir Philip Francis said in his speech against Warren Hastings, the progress of the Company had been "from factories to forts, from forts to fortifications, from fortifications to garrisons, from garrisons to armies, and from armies to conquests." These words, though used in denunciation of the policy indicated, seem to me to sum up the wonderful history of these days. A Company of merchants trading to the East had become a great Government, with an Army and Navy of its own, and powers of peace and war.

I propose to touch upon the general composition of the Army and its numbers, to explain how the central administration is constituted, to show what the territorial organisation is, and that of the Staff and Army Departments existing in these territorial areas, and then to pass on to the consideration of the organisation of the British and Native Armies.

I shall have to refer again to certain historical points in dealing with the organisation of the Native Army in India; but interesting as the story of the rise of our Eastern military power is, we must pass on to other matters, and before describing the machinery of administration, let us see what the military forces of India are which have to be maintained and governed, and thus get a general appreciation of the military situation.

You will remember that I pointed out the great natural and racial divisions of India, the Punjab, Bengal, Bombay, Madras, and Burma. Accordingly the Army in India is divided into these military areas or Commands, and each Command again into military districts. In each of the four large Commands there are, besides the British troops, the native troops, which are, so to speak, related to the particular area. Thus we find Sikhs and Punjabi Mahomedans, besides other classes, in

the Punjab Command, Hindustanis in the Bengal Command, Mahrattas in Bombay, and Southern Indians in Madras. Of course, just as outlying districts have been affiliated to these centres, so do we find soldiers of races not belonging to the dominating race in the particular area. I shall not trouble you with many figures, as you will find them in the tables in the Appendix, and as an interesting comparison I have shown the military forces as they stood just before the mutiny of 1857. In round numbers, the British troops are 74,000 strong, and the Native Army 158,000, or, with its reserves, 183,000, so that the Regular British and Native Army is about 257,000. But there is a second line of auxiliary forces, consisting of the Volunteers, to be reckoned as part of the British forces, the troops maintained by Native States for Imperial service, the regiments of Frontier Militia, and the Corps of Military Police, so that the total British forces, including the Volunteers, number 106,000, and the native forces 227,000, or a grand total of about 333,000 men.

This is the military force of to-day. Not quite so large an Army as it stood on the 1st April, 1857, just before the mutiny, when it numbered 40,000 European troops, and over 310,000 native troops, or 350,000 in all, but immeasurably stronger in its constituents and its power for the defence of India.

We are now in a position to deal with the machinery of administration of the Army, to show how it has been gradually evolved, and the principles upon which it has been founded.

The Army administration of very early days in India was simple enough. The Town Major of Fort William, in Bengal, for example, seems to have done a great deal of the work, and it is amusing to recollect that when the Adjutant-General's department was abolished in 1775 the duties were ordered to be performed by the senior Aide-de-Camp to the Commander-in-Chief.

In 1776 Warren Hastings created a Military Board, consisting of the Governor-General and other Members of Council to deal with military affairs generally; but in 1785 its constitution was changed, and it became a military body, with the Commander-in-Chief as President, and the heads of departments as members. It was abolished by Lord Dalhousie in 1853; the work had become over-centralised; there was a lack of individual responsibility, and its duties were therefore placed upon the heads of the Army departments which it represented. In the meantime, offices of military administration were formed, one termed the Military Department of Inspection and the other the Secret and Military Department, which were in a few years—in 1793—brought together as the Military Department, or the Department of Government dealing with military affairs, just as the Foreign Department in India deals with foreign affairs and the Home Department with domestic policy. Many minor changes have taken place in the course of time; but looking at the military administration as a whole, I think we are justified in saying that for the last hundred years there has been remarkable stability in the military government.

It may be well, perhaps, to clear the ground by stating that the Government of India, apart from the important functions of government and control exercised by the Secretary of State for India and his Council in this country, consists of the Viceroy and Governor-General, assisted by Members of Council, representing the great departments of Indian administration; and that the civil government of the country is carried on by the central or supreme government through Governors,

Lieutenant-Governors, or Chief Commissioners, ruling immense provinces and their teeming populations.

And the first and central fact to fix upon is that the Viceroy, as the representative of the Crown, and the Governor-General in Council, is, by his warrant of appointment from the Sovereign, responsible for the superintendence, direction, and control of the whole military government.

The outline is easily described. The supreme authority rests with the Governor-General-in-Council, the Council being the Cabinet of the Indian Empire. Two military authorities share the burden of work between them, the Commander-in-Chief and the Military Member of Council, the latter being responsible for the Army Departments of supply, transport, remounts, ordnance, military works, and finance, thus leaving the Commander-in-Chief, whose colleague he is, free to command the Army, to supervise its preparation for war in every branch of this immense business, and to satisfy himself by personal inspection that it is in a state of readiness.

The Military Department, a War Office of very modest dimensions, is the central office, and is the agency through which military business is submitted to the Viceroy, and, if necessary, to the Council. The Secretary of the Military Department may perhaps be said to correspond to a Permanent Under-Secretary in the War Office. He has great responsibilities in the conduct of military business, and is assisted by a staff of officers and clerks.

Both the Commander-in-Chief and the Military Member of Council have seats in the Indian Cabinet or Council, so that the Army is represented from every point of view.

If we grasp these cardinal facts of Indian Army administration, then we can easily fill in the outline. The Commander-in-Chief is, naturally, the prominent figure in the Army structure. He practically makes all appointments to the staff and commands, except some minor ones, and also appoints to the command of all native regiments.

Under him are the five Lieut.-Generals commanding the forces in the Punjab, Bengal, Bombay, Madras, and Burma, and he works through four chief officers, his personal Military Secretary, the Adjutant-General, the Quartermaster-General, and the Principal Medical Officer.

Under the Adjutant-General are grouped the Inspecting Officers of Cavalry, Artillery, and Volunteers, the Recruiting Staff Officers, the Director of Military Education, the Principal Veterinary Officer, and the Judge-Advocate-General.

The Quartermaster-General deals with the movement of troops and the distribution of the Army, and has under him branches for intelligence and mobilisation. These four chief officers and their deputies and assistants form the Headquarter Staff of the Army.

Next to the Commander-in-Chief stands the Military Member of Council in charge of the Military Department, dealing with the Army business which is not concerned with *personnel*, or with the command and training of the troops. There are five chief officers for this class of work, the Director-Generals of Ordnance, Supply and Transport, Remounts, Military Works, and the Accountant-General.

The Accountant-General is a military officer at the head of Army finance, and is the Chief of the Military Accounts Department.

Neither the Commander-in-Chief nor the Lieut.-Generals of the large Commands have any special responsibility for the Army Estimates,

and their direct financial powers are limited to comparatively small sums, while the Military Department is bound to refer questions of new or recurring expenditure to the Finance Department or Indian Treasury. On the other hand, the Commander-in-Chief has immense influence on the course of military expenditure, and the chiefs of the Army Departments of Supply, who have great individual responsibility, are constantly consulted by the Commander-in-Chief on questions affecting the Army which he may desire to bring forward.

The leading principles of Army administration in India are:—First, the separation between command and administration; secondly, that the commander and administrator have seats in the Council or Cabinet; thirdly, the preservation of the influence of the Commander-in-Chief on every important question of Army business by his presence in Council, and by his relations with the heads of departments; Fourthly, that every appointment connected with the Army, whether in command or administration, is filled from the Army.

Having dealt with the central Army administration, we must pass on to the organisation of the Army, and here something must be said in the nature of retrospect.

We have seen how the three Armies of Bengal, Madras, and Bombay came into being, each with its own Commander-in-Chief, Staff, and Departments.

Frequent wars and the expansion of British dominion led to increases in strength, reorganisations, and, when peace came, to reductions, to be followed immediately by further increase. Then came the convulsion of the mutiny of 1857. With some exceptions, the separate Armies of Madras and Bombay, and the distinct bodies known as the Punjab Irregular Force, and the Hyderabad contingent stood firm, when a large portion of the Bengal Army revolted. After this a new Bengal Army was created, gathering up the faithful few and the many whose aid we had invoked, and the whole of the forces of India were transferred to the Crown. A new military force had sprung into existence—I do not only allude to that splendid body of troops the late Punjab Frontier Force, but to the Punjab regiments generally—in fact a new Army had been created in reality, though not in name, from the advanced base in the north.

The work was an immense one, and I hoped to have seen among my audience to-day Field-Marshal Sir Henry Norman, who took such a conspicuous part in the reorganisation of those days, but unfortunately he is not able to come. But while numberless improvements were effected, and great changes were carried out in regimental organisation and in hundreds of other matters, the three Armies remained separate bodies.

It is far too long a story to tell how it was gradually borne in upon men's minds that the entire separation of the three armies, with a Commander-in-Chief in India—not at all a real Commander-in-Chief of the whole of the forces—with distinct staff and departments, each with its own methods, was not a satisfactory organisation for peace or for war. In 1879 a Commission was assembled, composed of the ablest and most experienced soldiers and civilians of the day, of which the illustrious soldier in the Chair was a prominent member, and reported in favour of disconnecting the Armies of Madras and Bombay from the local Governments, making at the same time a series of recommendations concerning the whole field of Army administration and organisation, their report really forming the foundation of

subsequent reforms; but while, as time went on, a large number of the changes they had proposed were carried out, it was not until 1895 that the three Armies were formed into four territorial Commands: the Punjab, Bengal, Madras, and Bombay. There had always been the strongest possible feeling against amalgamation or unification pure and simple, as we had the spectacle of the overgrown Bengal Army of the days of the mutiny before our eyes, and every lesson of history pointed to the danger of a large military body with identical interests and power of combination. What it was desired to do was to simplify the administration, to consolidate the control, and to push, as far as possible, the principles of decentralisation, preserving those racial and territorial distinctions which are the safeguards of an army serving alien masters, but serving those masters with a devotion and loyalty which for so many years have had no parallel in the history of the world.

It was felt that the Army needed to be made more efficient, in the sense that it must be more capable of defending India, that it must be made more mobile, while, at the same time, the greatest care had to be taken to preserve those distinctions of race and character, religion and class, which are so inseparably connected with the life of the collection of nations we call India.

This is the foundation of the Native Army of to-day. Changes have been made in the material of its units from time to time, and quite recently its regiments have been re-numbered; the names of Bengal, Madras, and Bombay have been abolished, separate forces and corps, such as the Punjab Frontier Force, the Hyderabad Contingent, and the Local Corps, have been absorbed into the Line, and the Staff Corps, instituted in 1861, has changed its title to that of Indian Army. With these changes it is all the more essential to hold fast, with the firmest grip, to the vital principle of territorial Commands, with areas corresponding, as far as possible, to the national and racial distinctions. And if we combine this with a Central Administration which shall watch over and guide the forces in these areas, coupled with the most complete decentralisation of work in these Commands, we shall preserve the principles upon which the Army of India has been founded by generations of statesmen and soldiers. The reverse of the picture would be one large homogeneous Army ruled by a powerful and dangerous centralisation, and liable to all the evils such an organisation would produce.

If we now turn to the Commands, we find that each of the four large ones has a Lieut.-General Commanding the Forces at its head, with a complete Army and Departmental Staff, representing on a smaller scale the Staff I have described in the Central Administration. The Lieut.-General is entrusted with considerable powers, but the process of decentralisation has not yet gone far enough, and has certainly not reached the point we desired should be attained when the new organisation was framed. It can never be complete until the Lieut.-Generals Commanding are entrusted with fuller powers and with greater financial responsibility.

The Commands are divided into districts, and you will see by a glance at the printed table the number there are in each Command. The first-class districts are commanded by major-generals, and the second-class districts by brigadier-generals, some of whom have

received the rank of major-general. As in the Central Administration and in the Commands, the machinery is the Army Staff and the Departmental Staff. The Army Staff employed in the districts in India follows generally the organisation of the Staff which, until recently, obtained at home. The Quartermaster-General's Department is represented at the headquarters of the great Command; but in the districts there is only one set of officers, the Adjutant-General's Department, duties being allotted to officers according to a prescribed division. Many years ago the Army Commission of 1879 recommended that the Staff should be divided into a General Staff, and a subordinate branch of the Staff for the ordinary garrison work. That plan, as I think unfortunately, was not carried out, but I hope that before long we shall see the formation in India, as in England, of a General Staff for the higher and more important work.

Time does not admit of a full description of the army departments, but a few words about these are necessary.

The Supply and Transport Corps may be said to correspond with the Army Service Corps of the Home Establishment, but the Clothing Department is also under the Director-General for administrative purposes. The transport was completely reorganised a few years back, and now consists of corps, and cadres, of camel, mule, and cart transport with fixed centres to facilitate expansion. There are thirty-seven of these corps and cadres with a peace complement of 3,000 camels, 16,000 mules and ponies, 7,000 bullocks, and 7,000 transport carts. In addition there is the transport of the Imperial Service Corps, with 4,000 animals and 2,000 carts. It is hoped also to establish a large number of camel corps in Beluchistan. A large staff of officers is also maintained to ascertain and register the resources of the country.

The Ordnance Department, officered from the Royal Artillery, has two branches: the first, the arsenals, ten in number, with five depôts, where large reserves of all kinds are maintained; and the manufacturing branch, with small-arm ammunition factories, cordite factory, shell factory, gun-carriage factories, and harness and saddlery factories, while we may expect that rifle and gun factories will be working before long. The policy, for some years past, has been to make India self-supporting in all munitions of war.

The military branch of the medical service is under the Commander-in-Chief, and comprises medical officers of the R.A.M.C. and of the Indian service. But the Indian Medical Service supplies large numbers of officers for civil work, a proportion of whom are liable to recall to the Army in case of war. Under the Medical Service are the Army Hospital Corps, the Bearer or Ambulance Corps of 6,000 men organised in 28 companies, and the nursing service. 28 British field hospitals and 47 native field hospitals are always maintained. There is also a Medical Store Department with depôts.

The military works services are undertaken by the Royal Engineers. They deal with all barrack and fortification work, a number of officers being also employed on civil works and on surveys, who would be available in case of war.

The Army Remount Department now controls the breeding of horses for the Army, as well as the supply of remounts. It has five remount depôts, and a staff of 20 officers, young stock being purchased at an early age and reared on the Government runs. Horses are also imported from Australia, and a few Arabs.

The Military Account Department, officered from the Army, has to deal with the whole of Army finance, and is chiefly centred at the headquarters of the large Commands, where the Controller of Military Accounts is at the head of the account and audit, and is the financial adviser of the General Commanding the Forces.

The Major-General Commanding a first-class district has as his staff Assistant Adjutant-Generals, and a Deputy Assistant Adjutant-General, a D.A.A.G. for Musketry, a Commanding Royal Engineer, a Chief Supply and Transport Officer, and a Principal Medical Officer.

In a second-class district one or two staff officers may suffice, but the other officers correspond to those in a first-class district. Garrisons or stations are commanded by colonels on the staff, or the senior officer, and the local staff consists of brigade-majors, the senior medical and veterinary officers, and garrison engineers.

I have touched upon the Central Administration, the large Commands, and the districts into which they are divided, and we must now turn to the organisation of the units of the Army.

It is unnecessary for me to trouble you with details of the regiments of cavalry, battalions of infantry, and batteries of artillery (horse, field, heavy, mountain, and garrison) of the British Army which are allotted to these Commands and districts. These strengths are higher than those at home, and are shown in the tables in the Appendix. The regimental system of the British Army is the same all over the world, and is, I venture to think, the finest organisation for the training of men to be found anywhere. Of course, local conditions have to be provided for, and native non-combatants are attached to British units to perform duties which are carried out by soldiers in other countries or by other means.

It is to the Native Army I must now specially invite your attention. When the reorganisation of 1895 was carried out, one of its special objects was to divide the unwieldy Bengal Army into its two parts, to draw up the Punjab troops to the Punjab, and to centre the Hindustani troops in the Bengal area, leaving the Madras and Bombay Armies to occupy, generally speaking, their own territories. The reason was obvious. Experience had taught us that Punjab troops degenerated if kept long in Bengal and Hindustan, while there was an inevitable tendency to undesirable assimilation. There was not the least intention of localising the troops in the ordinary sense of the word, and regiments could be transferred from one Command to another when required. This measure was carried into effect; but we must remember that certain changes have taken place in the composition of regiments during the last ten years, that the material has been improved in every portion of the Army, undesirable classes being gradually eliminated. The forces of the Punjab consist of Sikhs, Dogras, Gurkhas, Punjabi Mahomedans, and Pathâns. The Dogras come from the Lower Himalayas between the Chenab and the Sutlej, while the home of the Gurkha is Nepal. Dogras and Gurkhas are Hindus, the Hinduism of the latter being in many respects of a somewhat broad character. Pathâns, the Highlanders of the frontier, are Mahomedans, speaking the Pushtu language, and are Afghans with a large strain of Indian blood.

The Bengal Command comprises Hindustanis, both Brahmans and Rajputs, the priestly and warrior castes of Hindus; Jâts, also Hindus, an agricultural people to be found in the western portion of the united

provinces of Agra and Oudh, in the country round Delhi, and in Rajputana; Gurkhas and Garwhalis, the latter from the Himalayan region of Kumaon; some Jâts and Lobana Sikhs in the two Pioneer Regiments, and in the Sappers and Miners, which also have some Punjabi Mahomedans and Pathans, the Mahomedan element being represented but slightly.

The native troops in the Bombay area embrace several differing elements. Here we find among the Hindus, besides Mahrattas, Rajputs, Jâts, and Gujars of Rajputana, and some Sikhs, while the Mahomedans come not only from Rajputana, but from the Pathan and Baluch tribes and from the Punjab.

The Madras Army has been largely reconstituted, for as the practice of war has been displaced by long internal peace, it has become increasingly difficult to obtain a sufficient number of thoroughly efficient soldiers from the Madras territories. Apart from the eight battalions comprised of northern races and Gurkhas, and specially localised in Burma, which no longer belongs to the Madras Command, there are nine Punjabi infantry regiments in this portion of the Army, while fifteen corps are composed of men drawn from Madras territories, such as Madras Mahomedans, Moplahs, who are Mahomedans with an Arab descent, and Tamils and Coorgs, who are Hindus.

We see, then, that the dominant religions of the Native Army are Hinduism and Mahomedanism, although great differences exist in practice in different parts of India, and we may take it that the proportion is roughly about two-thirds Hindus and one-third Mahomedans. If we think of the composition of the Native Army, we cannot fail to be struck with the wonderful fact that every conquest has called fresh recruits to our standard. The Nepal war gave us the valiant and sturdy Gurkha, and the Sikh war gave us the men who are among the finest soldiers we possess, while we freely draw upon the Pathán tribes, with whom we have been constantly fighting. In many parts of India peace has, to a large extent, led to the decline of the martial spirit, but we have still immense resources in fighting men.

Having thus briefly indicated the general composition of the Native Army, we must pass on to the organisation of the units. The first thing to consider is the composition of the regiments. There are two plans which now practically hold the field: the class squadron and company system, and the class regiment. The class squadron regiments of cavalry—each regiment being organised in four squadrons—may consist, for example, of two squadrons of Sikhs, one squadron of Dogras, and one squadron of Punjabi Mahomedans. In some regiments there is a greater sub-division, and they might be called class half-squadron regiments. Class regiments are those composed of one class, as for example of four squadrons of Jâts. In the same way the infantry battalion may be composed of, say, four companies of Pathâns, two companies of Sikhs, and two of Dogras. In some cases there may be a further sub-division. Both these plans have advantages, and it may, I think, be fairly said that the real point is not to have too rigid and symmetrical an arrangement in an Army which is composed of elements so differing in characteristics.

Taking the whole of the cavalry and infantry, there are 50 class regiments and 127 class squadron and company regiments.

I must just mention that although the title "Staff Corps" has been abolished, the officers of the Indian Army are drawn from Sandhurst and also from British regiments in India, that the promotion is

after fixed periods, and that they constitute a body of officers for officering the Native Army and for filling many classes of military and civil appointments.

For many years after the mutiny native regiments were officered on what was called the "irregular system," the system, in fact, which existed in the days of Clive, under which there were very few British officers in native regiments. Changes in modern warfare and in training, as well as the great demand now made for officers, have necessitated their increase, and a further increase to the officers of the Indian Army will be needed if it is to be capable of great expansion.

A cavalry regiment has a strength of 12 British officers and 17 native officers, with a total of 625 native officers, non-commissioned officers and sowars, with 609 horses.

The main points of the cavalry organisation are: the responsibility of squadron commanders for training and efficiency in every respect, and the application of the *silahdar* system to all regiments except two or three in Madras. Under this, the horses, clothing, saddlery, and equipment, and even arms, except carbines and revolvers, belong to the regiment, the recruit paying a donation on enlistment, and the regimental fund being kept up by monthly subscriptions, the pay being correspondingly high to cover the individual expenditure. Every cavalry regiment has 89 transport mules, and in addition a baggage mule and grass-cutter are kept up by every two men, so that a native cavalry regiment in India is possessed of a high degree of mobility, and can move at the shortest notice.

The infantry battalion has normally a strength of 12 British and 16 native officers, and a total of 912 native officers, non-commissioned officers and men. The special feature of its organisation is that of "double companies," so that the battalion is divided into four units, with a double company commander over each, the subadars or native captains commanding the companies. The system of responsibility is, therefore, the same as in the cavalry, the double company commander being responsible for everything connected with his two companies, and working through the native officers.

The native mountain battery is officered by five Royal Artillery officers, with three native officers and 352 non-commissioned officers and gunners and drivers of the mules, including 33 transport muleteers permanently attached.

A company of native sappers and miners has usually two Royal Engineer officers, two British non-commissioned officers, and three native officers, with 166 non-commissioned officers and privates.

The rearmament of the Native Army commenced a few years ago, and was lately completed. The cavalry is armed with Lee-Enfield carbines and with swords, and a good many regiments with lances, while the infantry has the Lee-Enfield rifle. Some of the cavalry regiments have the rifle, and the whole will no doubt be armed with it ere long.

Recruiting for the Native Army is carried on by means of recruiting staff officers, the whole of India being divided into recruiting districts, and by parties sent out from regiments who work under the officer.

The Native Army is both a long and short service Army, for recruits can claim their discharge after three years, or can prolong their service for 21 years, when they receive a pension, and the majority are long-service men. Large numbers have small holdings of land,

and return to these after their service, or when they pass into the Reserve. The discipline of the Army is maintained by the native articles of war, a simple military code, and commanding officers have considerable powers, although they might, I think, be further enlarged. What is called military "crime" is marked by its absence. The Native Army is also essentially a "married" army, but wives and families usually live at the men's villages, although there are some exceptions to this rule, and as 30 per cent. of the regiment is allowed to go home during the leave season the men are able to visit their homes. The native soldier pays for his own food, and in the cavalry for the keep of his horse, but compensation is granted when the price of the rations exceeds a certain amount. On field and foreign service free rations are given. Another peculiar feature is that the native soldier builds his own lines of huts and barracks, allowances being given by Government. Besides the regimental school and regimental training there are various technical schools and courses for the native soldier. The musketry of the Native Army is extraordinarily good, bad shots being eliminated early in their service. There are still two points to which I must allude, however briefly. The first is that battalions of native infantry are linked together usually in threes, although Gurkha corps and a few others have only two battalions in the group. At a time of impending war, men can be transferred from one battalion to the other. Each group has a fixed regimental centre, or depôt, and it is here that the reservists are drilled, and upon this centre the Reserve battalions form on mobilisation. The second point is the Reserve. A limited Reserve exists for the native infantry, artillery, and sappers, a man being allowed to pass to the Reserve, if there is a vacancy, after five years' service. The total Reserve does not exceed 25,000 men, but the system is capable of expansion, and it has been decided to raise it to 50,000. The peculiarity of the Indian Reserve is that reservists do not join the Service battalion on mobilisation, but the Reserve battalions, as it has been thought better that the service battalions should go into the field as they stand, after sending unfit men to the depôt, and that the Reserve men should form the nucleus of the additional or Reserve battalions.

A great deal might be said about what I called the second line, or Auxiliary forces, the Volunteers, the Imperial Service Troops, the Frontier Militia, and the Military Police, but I have already trespassed largely on your patience, and only the briefest allusion to these forces can be made. In the Volunteers, about 32,000 strong, we find cavalry, light horse and mounted rifles, garrison artillery, engineers, and infantry. In any emergency they would be largely increased, and would be exceedingly useful in the defence of ports, railways, and cantonments.

The Imperial Service Troops, consisting of cavalry, mountain artillery, sappers, infantry, and camel and transport corps, about 18,000 men in all, are maintained by native States for the service of the Imperial Government. They have done excellent work in several expeditions.

The Militia is employed on the N.W. Frontier, recruited mainly from frontier tribes, officered by British officers, but is under the civil power.

The Military Police serve on the N.W. Frontier, in Assam, and in Burma, under the civil power. But they are mainly organised in battalions, and form, in fact, an excellent military force.

We have seen how the Army of India is commanded, administered, and organised, and what its composition is, but the sketch I have offered to you would not be complete without my attempting to show you, in the few minutes left at my disposal, the principles at least on which it is organised for war. In India mobilisation is by divisions and brigades formed of units drawn, whenever possible, from one area, and from particular stations.

Reserve battalions are formed at regimental centres of the depôts of mobilised battalions, and of the Reservists of the group. These Reserve battalions train the Reservists, act as the depôts of the service battalions, supplying it with drafts, and enlist and train recruits.

In addition to the various divisions constituting the Field Army, certain troops are told off for lines of communication, while what are called "obligatory garrisons," chiefly on the great lines of communication in India, have to be provided for when the Field Army is withdrawn.

A division consists of three infantry brigades of four battalions each, two British, two Native, with the following in addition:—

Divisional Troops,
Cavalry Brigade,
Ammunition Column,
Ordnance Field Park,
Field Hospital,
Veterinary Hospital,
Field Telegraphs,
Survey Party.
Field Post Office.

about 15,000 troops in all.

The essential points to bear in mind are that the territorial division of India is the basis of effective mobilisation, that mobilisation equipment is in possession of regiments, that every unit in India has its camp equipage and ammunition in its own charge or close at hand, the stores of field service clothing and supplies are at certain centres, and the ordnance and engineer parks in readiness in the arsenals. We cannot set the field army in motion with the rigid symmetry which is possible in other countries, because uniform distribution is impracticable, and we cannot recruit uniformly, but a good deal may still be done to approach the ideal simplicity of mobilisation.

You will see, then, that there are three phases, or periods, in the development of the Indian Army; the first, of its creation and increase, tried in many wars, but to be overwhelmed in part in the catastrophe of 1857, the military and racial differences between the portions of the Army being used to our great advantage; the second phase when it passed to the Crown, a period of reconstruction and reorganisation, involving immense labour and knowledge of the Army and of the country, followed by a time of consolidation and comparative rest; and the third period, the last quarter of a century, during which, besides changes in the organisation of the higher commands and the units, long strides have been made towards efficiency in every branch of the Army by applying the lessons learned in modern wars. In this period, the re-

organisation in 1895 of the three Presidential Armies into the four large Territorial Commands took place, and innumerable details had to be worked out, following mainly the plan of the Commission of 1879. In this period, too, we see the native troops of India garrisoning colonial stations, sending its soldiers to Africa, and rendering increased aid to the Imperial Government. And it is with this period that the names of Lord Roberts and the late Sir George Chesney are inseparably connected. The period has been one of continuous labour, and it would require a whole lecture by itself if I were even to touch upon all that has been accomplished in organisation, in armament, equipment, and in the defences of India. But the work can never stop; there are always plenty of defects to be remedied in every human institution, and we may feel assured that the present Commander-in-Chief in India will apply his great energies to their removal. Every now and then we must take stock, and see that we are working on sound principles, constantly reviewing the situation, and the requirements of the time and of the Army, for we may depend upon it that the organisation, or army, pronounced to be perfect stands self-condemned. But we must temper our criticism with knowledge and justice, and must be specially cautious of the way we handle the Native Army, and the political conditions bound up with it.

The Indian Army is small enough for the work it may have to do. The development of the railway system has increased our power, but long lines of railways have to be maintained in security, and I venture to think that our aims should be to follow up the steps we have taken already, and render the Army capable of larger expansion from the vast resources we possess, that we should strive more and more to increase the Field Army, that we should never rest until India has become a perfect base of operations in the East and Far East, and that, without sacrificing the truest interests of India, we should strive to unite more closely the Armies of the East and the West. The Indian Army exists for the defence of India, and the suppression of internal rebellion, but these objects are compatible with its power to take its place in the scheme of Imperial defence.

I was once accused by an eminent statesman of being a pessimist in military affairs. I am optimist enough to believe that in India we have an Army administration and organisation—the offspring of years of thought and labour—suited to the needs of the country, that in the officers serving there we have a body of most capable and hard-working men, and that in the Army of India England possesses a military force which has given signal proof of its devotion and of its power to take part in the defence of the British Empire.

APPENDIX.

Strength of Units in India.

Units.	*Each Unit.*
Royal Horse Artillery	162 (5 officers).
Royal Field Artillery	162 (5 officers).
Heavy Battery R.G.A.	96 (5 officers).
Howitzer Battery R.G.A. ..	223 (5 officers).
British Mountain Battery ..	147 (6 officers). 220 natives.

Native Mountain Battery ..	352 Natives (3 native officers). 5 British officers.
Royal Garrison Artillery (British)	145 (5 officers).
Frontier Garrison Artillery ..	3 British officers. 275 natives.
1st Sappers and Miners ..	1421 (20 British officers).
2nd Q.O. ,, ,, ..	1471 (21 British officers).
3rd ,, ,, ..	1339 (21 British officers).
British Cavalry	627 (29 officers).
Native Cavalry[1]	637 (12 British officers, 17 native officers).
British Infantry	1033 (29 officers).
Native Infantry[1]	924 (12 British officers, 16 native officers).

Territorial Commands Divided Into Districts.

I. Punjab Command divided into—

Three 1st Class Districts ..	Lahore. Peshawur. Rawal Pindi.
Three 2nd Class Districts ..	Derajat. Kohat. Sirhind.

II. Bengal Command divided into—

Two 1st Class Districts ..	Meerut. Oudh.
Six 2nd Class Districts ..	Allahabad. Presidency. Bundelkhand. Narbudda. Assam. Rohilkhand.

III. Madras Command divided into—

One 1st Class District	Secunderabad.
Four 2nd Class Districts ..	Bangalore. Belgaum. Madras. Southern.

IV. Bombay Command divided into—

Three 1st Class Districts ..	Mhow. Poona. Quetta.
Five 2nd Class Districts ..	Aden. Bombay. Deesa. Nagpur. Sind.

V. Burma Command with

One 2nd Class District	Mandalay.

Total—Nine 1st Class; nineteen 2nd Class Districts.
Total—28.

[1] There are small differences in strengths according to the part of the Army to which the unit belongs.

Organisation and Strength of Royal and Company's Army with Irregulars, Local Forces, and Contingents, 1st April, 1857. **A.**

	Royal Army.		Company's Army.												
			European.					Native.							
			Artillery.					Artillery.				Cavalry.			Infantry.
	Regiments Cavalry.	Battalions Infantry.	Troops H.A.	Field Batteries.	Companies Foot Artillery.	Guns.	Infantry Battalions.	Troops H.A.	Field Batteries.	Companies Foot Artillery.	Guns.	Regular Regiments.	Irregular Regiments. (*a*)	Companies Sappers and Miners.	Regular Battalions.	Irregular Battalions. (*a*)
Bengal	2	13	9	12	12	126	3	4	8	11 (*b*)	78	10	17½	12	74	24
Madras	1	3	4	12	4	96	3	2	3	4	30	8	—	9	52	—
Bombay	1	4	4	5	3	54	3	—	4	8	24	3	9	5	29	10
Punjab Irr. Force ...	—	—	—	—	—	—	—	—	3	2 (*c*)	24	—	6	—	—	11
Oudh „ „ ...	—	—	—	—	—	—	—	—	—	—	18	—	3	—	—	10
Nagpore „ „ ...	—	—	—	—	—	—	—	—	1	—	6	—	1	—	—	3
Hyderabad Contg. (*d*)	—	—	—	—	—	—	—	—	4	—	24	—	4	—	—	6
Gwalior „ ...	—	—	—	—	—	—	—	—	—	5	24	—	2	—	—	7
Jodpore „ ...	—	—	—	—	—	—	—	—	—	—	—	—	½	—	—	1
Malwa „ ...	—	—	—	—	—	—	—	—	1	—	4	—	1	—	—	1
Kotah „ ...	—	—	—	—	—	—	—	—	1	—	4	—	½	—	—	1
Bhopal „ ..	—	—	—	—	—	—	—	—	—	1	—	—	½	—	—	1
Total	4	20	17	29	19	276	9	6	25	31	240	21	45	26	155	75

a. Including local and provincial regiments and battalions not in particular "Forces" or "Contingents."
b. Including Peshawar Mountain Train.
c. Including Hazara Mountain Train.
d. In addition to the Contingents of which details are given from the Army Lists of 1857, there were also :—(1) The Mysore Horse, strength 4,000.
(2) Guzerat Contingent „ 3,756.

Strength of Armies and Forces. **B.**

	British.[1]			Total.	Native.				Total
	Cavalry.	Artillery.	Infantry.		Cavalry.[2]	Artillery.	Sappers and Miners.	Infantry.[2]	
Bengal	1,366	3,063	17,003	21,432	19,288	4,734	1,497	112,052	137,571
Madras	639	2,128	5,941	8,708	3,202	2,407	1,270	42,373	49,252
Bombay	681	1,578	7,101	9,360	8,433	1,997	637	33,861	44,928
Local Forces and Contingents	—	—	—	—	6,796	2,118	—	23,640	32,554
„ „ ... „	—	—	—	—	—	—	unclassified		7,756
Military Police	—	—	—	—	—	—	—	—	38,977[3]
Total	2,686	6,769	30,045	39,500	37,719	11,256	3,404	211,926	311,038

[1] Including Company's European troops.
[2] Including strength of Irregulars, local, and provincial units not in "Forces" or "Contingents."
[3] Parliamentary Paper 354 of 1862, p. 10.

Distribution and Strength of British and Native Armies, and Auxiliary Forces, in India.

Commands	British Army.									Native Army.									Auxiliary Forces.			
	Cavalry Regts.	Artillery.						R.E. Officers.	Infantry Battns.	Cavalry.		Artillery.			Sappers and Miners Cos.	Indian Submarine Corps.	Infantry Battns.	Reserve.	Volunteer Corps.	Imperial Service Corps.	Militia Corps and Battalions.	Military Police Corps.
		H.A. Batteries.	Field Batteries.	Heavy or Position.	Mn. B.	Garrison Cos.	Guns.			Body Guards.	Regts.	N. Mn. B.	Frontier Garr. Co.	Guns.								
Punjab ...	3	4	9	3	5	3	120	91	14	—	15	7	1	42	4†	—	44	19,908	66	33	6	21
Bengal ...	3	3	15	3	—	6	120	95	17	1	11	1	—	24	5	1	26	5,435				
Madras ...	2	2	9	—	—	1	66	28	6	1	3	—	—	—	9	—	31	3,276§				
Bombay ...	1	2	12	1	3	9	102	46	11	1	10⅛¶	—	—	—	9	2‡	31	5,223				
Burma ...	—	—	—	—	—	2	—	—	4	—	—	2	—	12	1	1	7	—				
Total ...	9	11	45*	7	8	21	408	260	52	3	39⅛	10	1	78	28	4	139	21,842	66	33	6	21

† Includes one in Chitral and 1st Military Railway Company. § Includes Burma. ¶ Includes Aden troop. ‡ One section at Aden.
* Includes three Howitzer Batteries.

	British.					Native.					
	Cavalry.	Artillery.	R.E.	Infantry.	Total.	Cavalry.	Artillery.	Sappers & Miners.	Infantry.	Reserves.	Total.
ab	1,881	3,612	91	14,460	20,051	9,411	3,725	585	39,775	[10,908]	53,496
al	1,881	4,522	95	17,550	24,048	7,018	1,393	708	24,072	[5,435]	33,191
as	1,256	1,968	28	6,188	9,440	1,839	37	1,569	26,185	*[3,276]	29,430
ay ...	627	4,178	46	11,358	16,209	6,673	1,575	1,398	25,197	[5,223]	34,843
a	—	290	—	4,132	4,420	—	680	170	5,931	—	6,781
erves ...	—	—	—	—	—	—	—	—	—	—	24,842
xiliary Forces	—	—	—	—	32,000	—	—	—	—	—	44,500§
w											
al	5,645	14,577	260	53,688	74,170	24,940	7,410	4,230	121,160	24,842	227,083

[Reserves not counted in Command Total.]

Total—British Troops 74,170 ... Auxy. Forces (Vols.) 32,000 ... Total 106,170

„ Native „ 157,741 } ... „ „ { I.S.T. 18,000 / Mil. 6,000 / M.P. 20,500 } ... „ 227,083

„ „ Reserves 24,842 }

Grand Total ... 333,253

* Includes Burma.

§ Imperial Service Troops ... 18,000
Militia Corps 6,000
Military Police 20,500

44,500

The "Levies" in the Punjab and Baluchistan, numbering about 4,000, are not included, as they are not officered by Europeans or enrolled as military bodies.

The CHAIRMAN (Field-Marshal the Rt. Hon. F. S., Earl Roberts, V.C. K.G., K.P., etc.) :—I am sure we are all very grateful to Sir Edwin Collen for his clear and most interesting lecture on the Administration and Organisation of the Army in India. The history of the origin and development of the Army in India has always had great fascination for me. Its earliest days and deeds have been recorded in great detail by Orme, who wrote of it more than a century ago. Since then there have been other histories written, but none that I know of bringing them up to any very recent date, or with anything like the detail with which Orme wrote. We have, of course, the accounts of the artillery of Bengal, Madras and Bombay, and the records of those magnificent European regiments which made such histories for themselves during the 18th and the first half of the 19th centuries. And during all those great battles, I think the artillery of either one Presidency or the other took part. What part those regiments themselves took is emblazoned on their colours at the present day. I have been looking round the room, and I can only see one officer here, who, like myself, belonged to the Indian Army as it existed before 1857. I may be wrong.

A VOICE :—Two or three.

The CHAIRMAN :—I am very glad to hear it. I can only recognise General Sir Allen Johnson. Probably there are not more than three

or four of us serving now, and I believe I am the only one on full pay serving, who were in India in 1857, when we were astonished by the report that the Army had mutinied. Thirty-five years after that event I witnessed the formation and development of the new Army which Sir Edwin Collen has told us so much about. As he also mentioned, I was a member of the Commission, under Sir Ashley Eden, which practically recommended the system carried out some 16 years afterwards, in 1895, the abolition of the Presidential Commands. I had the honour to command that unique force, the Punjab Frontier Force; most of the regiments belonging to it served during the Mutiny with me, and many of them were under my command in South Africa. I had the honour to command the Madras Army for 4 years, and the Army in India for 7½ years. I mention these facts that you may understand that in venturing to express an opinion on the value of the Indian Army, I can say that I have had with it a very close acquaintance and been connected with it for a great number of years. I have no hesitation in endorsing the opinion which Sir Edwin Collen has given you as to the value of the Army. A most magnificent martial spirit pervades all ranks and all classes; the native soldier is most obedient, most willing, most capable of undergoing great privations when necessity arises, and most eager to follow his officers, whom he believes in. The British officer well deserves the confidence which the native soldier places in him; he takes the keenest possible interest in his profession; he is ever to be found in front in time of danger, and he treats the native soldier with the greatest kindness and considération. The Army in India is stiffened by the pick of the British Army, 74,000 odd men, soldiers of the average age probably of 25 or 26 years. And I think that such an Army, 150,000 natives—I wish there were more—and 74,000 or 75,000 British—I wish they were more too—we may all be proud of, and I can only say I am very proud to think that I belonged to the Indian Army.

CAMPAIGNS AGAINST INDIA FROM THE WEST AND THROUGH AFGHÁNISTÁN.

Translated and condensed from the Russian of Major-General L. N. Soboleff, by Lieut.-Colonel W. E. GOWAN, Retired, Bengal Army.

Continued from June JOURNAL, p. 697.

BEFORE we continue the narrative of the subsequent operations of Nádir-Sháh in India, we will examine, briefly, the question as to how far the two conspirators actually assisted Nádir-Sháh in his invasion of that country. We are told by historians, who have written on this subject, that Nádir-Sháh availed himself of the services of the turbulent vassals of the Indian Emperor. But in this there is nothing in any way surprising. Who is there who, in his place, would not have done the same? But what there is strong reason to doubt is this, that events really occurred quite as historians of India, who have desired to justify, at any cost, the action of the Emperor of India, have done their best to make out. In the elucidation of this question we cannot do better than cite, as worthy of merit, the authority of Malcolm, who had ample opportunities of studying, in Persia herself, all sources of information relating to the history of Nádir-Sháh. Here, for instance, is what he says in his splendid "History of Persia":—"The Nizám has been accused of inviting the Persians to invade India, but for that charge there is not a single shred of trustworthy evidence. We have, therefore, no sort of intelligible motive for ascribing such a piece of treachery to one of the most powerful of the nobles of the Empire. Such accusations always serve as the weapon wherewith endeavours are made to defend incapacity and vileness of character. The contemptible Court of Delhi, perceiving its own weakness, endeavoured to convince itself that Nádir-Sháh would never undertake a campaign against India. Hence it presented to itself an exaggerated idea of the strength of Kandahár, and of the bravery of its defenders. Later on, when that city was captured, the same Court pictured to itself the return of the Persian Monarch to his own dominions; finally, when even it had to acknowledge that Kábul had been taken, it imagined that under no conceivable circumstances would Nádir-Sháh be induced to leave that place. And this mental blindness only began to be a little illumined when the news came that Nádir-Sháh had crossed the Indus. Aroused at last, and perceiving the immediate danger which threatened his Empire, Muhammad-Sháh with his entire Court and all the troops which he could muster, advanced to the plains of Karnál, which extend along the banks of the

river Jumna, and are approximately one degree to the north of Delhi; and he there constructed a fortified camp, and raised upon its defences, as a useless method of protection, guns of large calibre."[1]

Malcolm then goes on to say that the causes, which induced Nádir-Sháh to advance against India, were not groundless, the Government at Delhi having acted unwisely, in offering, to the Afghán enemies of Persia, an asylum within the limits of Indian territory, since, by so doing, Nádir-Sháh might very naturally have fears that these same Afgháns would again nullify the conquests which he had made, and would once more carry on a bloody war with Persia. Malcolm then observes that the principal motive for Nádir-Sháh's invasion of India was his desire to gain rich spoils, since he had repudiated any intention of conquering Hindustán. On this subject Malcolm thus writes:—"In any case, if Nádir-Sháh ever had any such intention, he must have speedily cast it aside, after studying, on the spot, the condition of affairs into which India had then been brought. Let us then admire the greatness of the spirit of this man, who, in the supreme moment of his triumph, could resolve to forego such a glorious undertaking, and who sought not even to preserve at the Court of Delhi any other influence, than that which he had acquired by his own noble and magnanimous course of action with regard to the Emperor, by restoring him to the Throne."

After various State ceremonies had been carried out, in the course of which Nádir-Sháh continued to show his Royal captive every mark of respect, the great Turkumán informed Muhammad-Sháh that, in order to strengthen the ancient alliance between Persia and India, he would restore to him his sovereignty, and that every mark of friendship and support would be offered to the family of the Gurgáns.[2] Touched by such unprecedented magnanimity, Muhammad-Sháh expressed the desire to bestow upon his fortunate rival all the wealth, which had been hoarded up in the palace at Delhi by his predecessors, and which consisted of a colossal amount of precious stones, as well as gold, silver, rich brocades, and other articles.

Nádir-Sháh's historian tells us that although the wealth of all the sovereignties of the world, in comparison with all this store, would not equal one-tenth part, yet the bounteous offering appeared in no way to excite the cupidity of Nádir-Sháh, and that he, to all appearances, at least, paid no special attention to the proffered gift. Nevertheless, at the earnest entreaty of Muhammad-Sháh, he consented to accept the same, and appointed a large number of his devoted adherents to make arrangements for the safeguarding of all this wealth.

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[1] Nádir-Sháh's own criticism of this false plan of operations is highly instructive, and is also very much to the point. There is no space to quote the whole of it, but here is a portion:—"Besides this, you have foolishly cooped yourselves up in your *murchas* (entrenchments), not considering that if your enemy was stronger, you could not remain within these barricades without either water or grain; and if he was weaker, 'twas both unnecessary and disgraceful to suffer yourselves to be besieged by him." (Fraser.)—W.E.G.

[2] The descendants of Timur, of whom Bábar was in the direct line.—*Author.*

According to Malcolm, Muhammad-Sháh's nobles, following their master's example, likewise made over to Nádir-Sháh all their stores of money and precious articles.[1]

Furthermore, a heavy indemnity was laid upon the inhabitants of Delhi. According to a statement made by an Indian historian—a statement which is no doubt exaggerated—this contribution amounted to the colossal sum of 25 *krors* of rupees, or say £2,500,000. And, lest the inhabitants should carry away their property, guards were placed at all the gateways of the city.

Towards the end of February famine made its appearance, whereupon Nádir-Sháh ordered depôts to be opened, at which all the inhabitants were permitted to buy food. Nevertheless, the indemnity, which had been imposed upon the city, continued to be exacted. And since the collectors of this contribution were selected from amongst the local population, and from persons who proved to be extremely rapacious, they not only terribly abused the duty imposed upon them, but made a good thing out of their exactions, and failed to take to the Persian treasury all that they had squeezed out of the unfortunate inhabitants. Some of them, indeed, only paid a sixth part of their exactions. They, in short, screwed out of the richer people all their secreted wealth and, in doing so, mercilessly killed many of them.

Many of the unfortunate natives, in their desire to save their belongings, preferred to commit suicide rather than reveal where they had hidden them. All these occurrences greatly exasperated the populace; but the terror, which had taken possession of the people, was soon dissipated when they witnessed the exemplary discipline of the Persian troops, a number of whom were quartered within the city walls. And, at the same time, a command was issued by Nádir-Sháh that if any of his men injured an Indian subject he would be visited with severe punishment.

All this time the inhabitants continued to crowd round the food depôts, and to jostle each other in their efforts to secure food. An Indian historian has related that, on one such occasion, one of Nádir-Sháh's soldiers, seeing a native taking away some pigeons, snatched them from him, whereupon the man cried out that Nádir-Sháh had ordered the pillaging of the inhabitants. A vast crowd then collected, and someone cried out that since the invader was already dead, the moment had arrived for them to attack the Persian soldiery. Those of the inhabitants, who had contrived to secrete some weapons, at once proceeded to attack the guards at the city gates, and, having cut to pieces about 2,000 of them, drove the rest of them from their posts; but under cover of night they managed to obtain refuge in the citadel. At once the popular fury rose to such a height that even the Persian troops, who had been quartered upon the more notable Indians, to insure the personal safety of such persons, were massacred, at the instigation of the very people whose sucurity they had insured.

It was shortly before midnight on the 1st (13th) March when the news of the massacre of his troops reached Nádir-Sháh. He at once summoned Muhammad-Sháh and the Nizám, and, according to the testimony of the Indian historian, threatened them with death

[1] Besides all these "offerings" there were taken from the provinces of India all arrears of revenue, and the whole amount was transferred to the Persian treasury!!!—*Author.*

as the inciters of the outbreak. But on their swearing on the *Korán* that they were entirely innocent in the matter, Nádir-Sháh's fury was at once turned upon the inhabitants of the city; but first of all and in order to prevent any fresh outburst, he sent some trustworthy persons to announce that he was still alive. Whereupon these men were also killed. He then gave orders to the rest of his troops, quartered outside the city, to remain on the alert for the rest of the night, and, as soon as it was dawn, he mounted his horse, and proceeded with an escort to the principal mosque of the city.[1] He thought that his personal presence would dissipate the false rumour as to his death and would quiet the populace, but he was deeply deceived, for a shot was fired at him, which, however, after missing him, killed one of his officers.[2] This was enough. The enraged Turkumán, usually under remarkable self-control, now gave full vent to his wrath, and, after awaiting the arrival of a body of his troops, ordered the city to be given over to pillage and destruction. And to insure that this bloody work should be effectually carried out, the Persian troops were distributed over various parts of Delhi for the punishment of its inhabitants.[3]

Seeing the preparations that were being made, despair and terror took possession of the populace. Soon the walls of the highest buildings were levelled with the ground. Palaces were broken into. Men and women were given over to slaughter, until at last the canal, which flowed through the city, was red with the blood of the victims. Groans and wailings filled the air, and flames of fire seized upon every part of the city.

All the inhabitants, from the entrance to the principal mosque and as far as the Ajmere street, were slain, and the massacre went on from dawn till sunset. Indeed, the stupor that seemed to fall upon the wretched inhabitants of Delhi was so profound that they scarcely defended themselves at all, so that one soldier sufficed to put to death an entire family. At evening some few of the remaining inhabitants made efforts to beg for mercy, but Nádir-Sháh, after issuing his orders for a general massacre of the people, had withdrawn to a small mosque,[4] where he remained plunged in gloom and deep thought, which no one dared to interrupt.[5] Suddenly however, Muhammad-Sháh rushed into this mosque, and cried out, "Spare my people," to which appeal Nádir-Sháh replied: "An Emperor of India must never petition in vain," and, having said this, he immediately gave orders for the slaughter to cease. This order was at once obeyed, and all historians see in this circumstance *an indication of the strict discipline* which, at that time, held the Persian army in subjection.

The number of victims is not exactly known. Mirza-Mehdi puts it at 30,000, but Fraser, a contemporary of the event, who compiled a history of Nádir-Sháh, quoting an account current at the time, reckons it at 120,000. Otter raises the number to 240,000. On the

[1] The Jama-Masjid.—W.E.G.

[2] Malcolm, Vol. III., p. 119.—*Author.*

[3] Mirza-Mehdi's account.—*Author.*

[4] The Golden Mosque of Roshan-ud-Daulat.—W.E.G.

[5] Malcolm, Vol. III., p. 120.—*Author.*

other hand, the Indian historian Dekán, reduces the total to 8,000. And, finally, Malcolm is of opinion that the figures last quoted are nearest to the truth.

During their bloody work, Nádir-Sháh's soldiers, of course, secured an immense amount of loot. As soon as the terror-stricken people had to some extent quieted down, a most strict inquiry was instituted as to the causes which had brought about the attack on the Persian garrison, and it would seem that many of the leading men of the Empire had played the part of fierce instigators to this rash act,[1] and that amongst them was Muhammad-Sháh's *Wazir* or Prime Minister. In any case, 470 persons were held to have been implicated, and all of them were immediately executed.

The unfavourable impression produced on the inhabitants of Delhi by the awful cataclysm which had taken place was, to a certain extent, effaced by a series of festivities attending the marriage of Nádir-Sháh's son to a Princess of the house of Timur.

Meanwhile, Nádir-Sháh ordered a collection to be made of all the valuables which had been added to his treasury. These consisted of heaps of gold and silver, vases, *articles de luxe* set with precious stones, etc. Splendid brilliants and marvellously beautiful pearls were then made over to Nádir-Sháh as part of his Crown jewels. Amongst these gems was most conspicuous the golden peacock, which ornamented the Imperial throne.[2] The tail of this peacock was studded with jewels of every kind, and gems [the collection of centuries], which were valued at more than 20,000,000 rupees (or, at the rate of exchange quoted in the Note, at £2,500,000).

Malcolm estimates the property thus acquired at from £30,000,000 to £70,000,000. Nádir-Sháh's own historian puts its value at a still higher figure; but Barr, in his interesting history of India,[3] says that Nádir-Sháh took away from India in money alone the sum of *one milliard eight hundred thousand francs, besides two milliards' worth of precious stones and other valuable metal goods.* And, added to all this, he increased his transport train by 1,000 elephants, 7,000 valuable horses, and 10,000 camels.

Thus Nádir-Sháh must have become the richest monarch of his day.

But, however this may be, the booty which he obtained at Delhi was so excessive that Nádir-Sháh sent orders that, for the space of three

[1] Fraser says that they were the following:—Syad Niaz-Khán, Shah Suar-Khán, a relation of Kurrib-Khán and Raibán Nazr.—W.E.G.

[2] This can hardly be the case, inasmuch as Fraser, in his "Short History of the Moghul Emperors" (p. 56), writes as follows:—"Syed Abdullah-Khán . . . hearing of his brother's murder, had taken out Sultán Ibrahim, son of *Rafi'al-Shán*, and proclaimed him Emperor. Gathering together what treasure he could, *and having broken to pieces the famous throne* (which cost Sháh-Jahán nine *krors* of rupees, which at 2s. 6d., amounts to £11,250,000) in order to pay his soldiers, he soon completed an army of 50,000 horse, and marched out to engage Muhammad-Sháh." Where then did Muhammad-Sháh get the money to remake this throne?—W.E.G.

[3] Vol. I., p. 342.—*Author.*

years, none of his Persian subjects would be required to pay revenue. Meanwhile, he was enabled to maintain a huge army.[1]

Nádir-Shah had a great fancy for gems of all sorts, and we will here relate an anecdote which very clearly characterises him as a man of unusually inflexible will. On the march back from India he discovered that certain of his best jewels had been plundered by his troops. Without waiting long to reflect upon his course of action, he ordered every man to be searched. The soldiers grumbled at this procedure, but the result was that not only were they deprived of what they had plundered from him, but they had taken from them other gems which they had managed to loot from someone else in the course of the Indian campaign. Nádir-Sháh's command having been thus minutely carried out, the army continued its march in perfect order. Such was the state of discipline in the ranks of this great leader.

The great conqueror now began to make his preparations for the return march. But, before finally leaving the capital of the Indian Empire, two matters of importance remained for him to carry out, and to these he devoted especial attention: one of these was the bestowal of suitable rewards upon his soldiers for their brilliant services, and the other was the firm re-establishment of Muhammad-Sháh upon the throne which he had justly forfeited. Upon the officers of his victorious army he conferred valuable presents in the shape of robes of honour, weapons of various kinds, money and precious stones. To every soldier and camp follower he gave a gratuity of 100 rupees. And the various officials of his Court were likewise suitably rewarded.

On the 7th (19th) May, after summoning to his presence all the high officials of the Indian Emperor. Nádir-Sháh presented to each of them a robe of honour, a sword, a dagger ornamented with precious stones, and a horse of Arab blood. After this ceremony, and in the presence of a vast throng, he took Muhammad-Sháh by the hand and led him to the throne, placed him thereon, and girded him with a valuable sword, both belt and sword being ablaze with precious stones. And then, in accordance with an ancient custom of the East, he arrayed him in a sumptuous Imperial robe, literally sparkling with huge diamonds. After this he placed a jewelled turban on his head, and a State seal of large size in his hand.

Muhammad-Sháh, visibly agitated and overcome by this striking act of *largesse*, spoke as follows: "Since, thanks to the bounty of the famous Nádir-Sháh, I am still reckoned amongst the number of crowned personages and of fortunate sovereigns of the Universe, I beg His Imperial Majesty to receive as a gift, and to incorporate in his sacred Empire, those provinces which lie beyond the Attock (that is, the upper and central course of the Indus) and also the Sind (the name of the lower course of the same river), beginning from the borders of Tibet, and extending to the point, at which the named river, or reaches of the same river, flow into the Ocean, and, in addition to

[1] Each man of this army frequently received, besides his pay, lump sums; for instance, after the capture of Kandahár, every soldier received a gratuity of three months' pay, after the victory at Karnál and the capture of Delhi the sum so distributed was much larger.—*Author.*

these provinces, that of Tatta or Sind, with the ports and lands appertaining thereto."[1]

Nádir-Sháh's historian, Mirza-Mehdi, who was well acquainted with the history of ancient Persia, tells us that his master accepted this cession of territory, since he considered that the greater portion of the country situated to the west of the Indus and opposite to Kábul and Ghazni, which had belonged to Darius the Mede and to Cyrus the Persian, the first founders of the dual Empire, was an integral part of the province of Khurásán.

Historians have condemned many of the actions of Nádir-Sháh, and most of these writers, without any knowledge of all the circumstances which attended the massacre in the city of Delhi, have appraised him as a mere savage, who had been fortunate in his undertakings, and as one who recalled the times of Chingiz-Khán and of Timur. But Malcolm, who was well acquainted with the history of Persia, sometimes expresses his surprise at the moderation which he displayed. He even says that not a single desire to plunder India ever guided his course of action, and he inclines to the view that even though Nádir-Sháh may have at one time entertained the idea of conquering the Indian peninsula and of annexing the whole of it to the Persian Empire, he put away from him any such ambitious thought as soon as he had witnessed the condition of affairs in that country.

That he was a man of great severity is open to no sort of doubt; but amongst the number of Asiatic sovereigns of the period contemporaneous with his own, he does not stand out with any special prominence in this respect. On the contrary, many of them were infinitely more severe than he. And even in Europe, during the first half of the XVIIth Century, the monarchs were not remarkable for any exquisite softness of character, a quality which apparently only came into operation with the very end of the next century. If, then, we judge Nádir-Sháh as an autocratic sovereign, we cannot be otherwise than surprised at his deep political sagacity, tact and moderation. And certainly one so endowed could not but have perceived that whilst the Persians surpassed the natives of India in martial bearing, yet, in other respects, they were inferior to them, and, therefore, that they would never succeed in governing such a vast and thickly populated country as India.

Had Nádir-Sháh been a younger man, and had he allowed himself to be influenced by the more warlike of the races of Persia, he might have been induced to undertake the task of incorporating India with the Persian Empire.

But he was now entering upon old age, and that profound wisdom, which maturer years sometimes, but only sometimes, bring with them, and which, in his case, were linked with the experience of forty years of uninterrupted strife, imbued him with the conviction, in the highest degree prudent, that he had better lean to the side of caution and moderation.

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[1] Fraser gives, on pp. 223-226 of his "History of Nádir-Sháh," a translation of the treaty, embodying "the cession made by Muhammad-Sháh to Nádir-Sháh of all the territories to the westward of the river Attok." And it may confidently be predicted that whenever the fate of Persia is decided, a good deal more will be heard of this treaty in connection with "the proper limits" of that now fast decaying State.—W.E.G.

Independently of this, he knew, as no one else knew, the utter depravity and weakness of the true Persian, and he clearly recognised that if he was to enter with confidence upon the task of completely restoring the greatness of the Persian Empire [the greatness, that is, which existed in days long before his own], he would be indebted for any measure of success not to the Persians themselves, but to those warlike races that dwell on the outskirts of that country, such as the Turkumáns, Kurds, Afgháns, Bakhtiáris, Georgians, Uzbaks, Hazáras, and others, indeed all those races, which by the strength of his character, and by his remarkable talents, as a born leader of men, he had brought into such subjection that they, whilst still free to follow their own warlike propensities, had to acknowledge in him their master and leader, and so were ready to follow him whithersoever he wished.

Nádir-Sháh, indeed, stands above the three greatest of the Monarchs of Persia—Darius, Cyrus, and Naushirwán—for he so raised the fallen kingdom that it once more became the greatest of the Asiatic Sovereignties. And the ultimate results of his campaign against India, the restoration to Persia of her ancient provinces and the re-establishment of Muhammad-Sháh on the throne of Delhi, will, from the point of view of international right, be a sufficient justification, by the verdict of history, for his invasion of the Indian Peninsula; and, in this respect, he should be placed above Alexander the Great, who sought the path of conquest, merely for the sake of conquest.

Before he took his departure from Delhi, Nádir-Sháh once more summoned the magnates of the Indian Empire, and impressed upon them the counsel of wisdom and moderation. He also reminded them that from the moment of the restoration to the throne of their lawful Emperor, coins would be stamped with the name and titles of Muhammad-Sháh, and that prayers would be again offered up, on his behalf, in all the Mosques. To the rulers of the various States of India, subject to the Court of Delhi, and to the provincial governors, he issued a proclamation, in which he bid them prove faithful to their lawful Emperor, adding: "If, which God forbid, any rumour shall reach us that you have risen in rebellion against your Emperor, we shall wipe you off the face of the earth."

But although Nádir-Sháh displayed towards Muhammad-Sháh and his nobles every mark of outward respect, he did so for exclusively political reasons, and in order to establish in an Empire, contiguous to his own, the peace and quiet that were so indispensable for both Sovereignties. Yet, in his heart, he despised the whole lot of them. Indeed, long before his campaign against India, he had received accurate information concerning the weakness of character, and the indolence of the Indian Emperor. Contemporaries have told us that Muhammad-Sháh was always to be found with a cup of wine in his hand and a mistress in his embrace. And, during his short stay in the country, Nádir-Sháh became thoroughly convinced of the truth of all that had been reported to him concerning the minions of the Court of Delhi.

On one occasion, it is said, that whilst he was conversing with Kamar-ud-Din-Khán, the *Wazir* or Prime Minister of the Indian Empire, Nádir-Sháh asked him how many wives he had. The *Wazir* answered: "Eight hundred and fifty." Whereupon Nádir-Sháh ejaculated: "In that case we must send you, out of the number of our captive women, one hundred and fifty more, in order that you may be qualified for the rank of *Mim-Báshi*, or 'commander of a thousand'!"

(*To be continued.*)

GERMAN IDEAS ON THE RÔLE AND EMPLOYMENT OF CAVALRY.

Translated, by permission of the Chief of the 2nd Bureau of the French General Staff, from the "Revue Militaire des Armées Étrangères."

MODERN Tactics are only a new step forward along an already old road. The late Anglo-Boer war has called forth in certain circles new ideas as to the *rôle* of cavalry.

The English cavalry, often surprised in open country, only sent in to the authorities very insufficient intelligence, while in actual fighting it played no part. To use one expressive word, it was a "failure." In consequence, it has been hastily assumed in some quarters that cavalry must give up mounted action.

The lance, a weapon proscribed by Lord Roberts, is no longer mentioned. The sabre might still be tolerated, but the true arm is the carbine while the use of the horse is only to assure more rapid movement from point to point.

Nothing is to be feared from an enemy's cavalry, even when very superior in numbers, so long as men could rapidly dismount and oppose the hostile squadrons with rifle fire, the great thing being to carefully avoid a hand-to-hand action with the sister arm.

These principles being admitted, it consequently followed:—

1. The effective of the cavalry could be reduced, the large units of this arm being broken up and divided among the infantry;
2. No more masses of horsemen, no more charges, which recall the heroic days;
3. Instruction in fighting on foot should take first place—in some cases, must be the whole instruction.

The study which follows seeks only to show the opinions expressed in Germany on the different questions raised. Readers need not expect an account of a lively polemic between the partisans of "shock" and those of "fire" tactics; between the partisans of the lance and those of the sabre.

There has been no such polemic.

But it is none the less interesting to ascertain the trend of ideas, after a series of events, that are sometimes presented as new facts which should revolutionise war.

* * *

For many years past every German writer on the subject has sought to prove the necessity for increasing the effective strength of the cavalry. These complaints have lately assumed a very lively com-

plexion. On the eve of the vote of a new Army Bill it was considered necessary to prepare public opinion for the new sacrifices demanded.

Opinion, on the other hand—at least, that of the Reichstag—appeared so unfavourable to the project, that the bringing forward of the new Bill has been postponed. But we only wish to study here the movement of ideas in military circles, and not the views of the public. The authorities wish to see the effective strength of the cavalry increased. Let us examine the arguments put forward by those who are pleading for this increase.

The method of procedure is known, and often used in Germany: A dark picture is painted to prove that both, in the East and West, the cavalry of the Triple Alliance is in a state of lamentable inferiority in face of the Russian and French.

According to Lieut.-Colonel Fabricius, Germany and Austria together could only put into line on the Eastern Frontier 449 squadrons, as against 711 Russian. Against France, Germany could only oppose 198 squadrons to 236.

"This state of things," says the writer, "is all the more disquieting when we consider that the French and Russian cavalry are stationed, in time of peace, very much nearer the frontier than the German," and he concludes by urging the necessity of creating 47 new squadrons.

His demands, however, are moderate, compared to those of Pelet-Narbonne. That indefatigable writer, in his work "More Cavalry," utters "a cry of distress in the interest of the defence of the country."

"For several years," he writes, "persons well acquainted with the military situation have raised the disquieting question: When will our Army authorities lay before the Reichstag a Bill to so increase the German cavalry as to put an end to a situation which can only be considered as fraught with immediate danger?"

In agreement with Bissing and Bernhardi—if we only cite writers recognised as the best authorities—Pelet-Narbonne shows that the *rôle* of cavalry in future wars has in no way been diminished.

"In the future, some millions of men will be in line. . . . . With such masses obliged to extend, not only as regards their front, but also as regards their depth, more time is required to concentrate before the decisive point.

"The zones of safety and of scouting must be more extended.

"The difficulties of this duty have increased proportionately to its importance."

Bernhardi develops the same arguments,[1] and comes to the conclusion that: "It may be said, with some appearance of truth, while the tactical *rôle* of cavalry has decreased, its strategical importance has considerably increased."

It may be admitted, following up this idea more closely, that inasmuch as the power of modern arms has rendered all surprise by fire disastrous, so ought the medium for ensuring safety to be more developed than formerly. It ought, at the same time, to be more mobile: riveted permanently to the troops to be covered, it would condemn them to ataxy; like the steel nets, which protect battle-ships at anchor against torpedoes, but prevent rapid movement.

To all units, from detachments up to army corps, the necessity of a numerous cavalry is therefore imperative.

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[1] "Unsere Kavallerie im Nächsten Kriege," Berlin, 1903.

At the same time, Bernhardi justly observes that the railways, which, as lines of communication, are both so essential and so fragile, offer new objectives to cavalry.

The perfecting of the fighting machine in general should increase, then, the importance of cavalry, and the interest in seeing it both numerous and strong; and truly we may well ask if the constant diminution of the cavalry in all Armies is not caused more by budgetary, social, and political reasons than by the increasing power of weapons of offence.

Pelet-Narbonne holds, in any case, that we have gone too far on that road; he seeks to lay down the proportion of cavalry necessary in a modern Army, showing that under Napoleon it was one-fifth of the numbers of the infantry, that it at present is only one-tenth, and that it is necessary to bring it up again to about one-eighth. He consequently calls for the creation of "166 new squadrons"! He admits, moreover, that he is under no illusion as to the realisation of his proposals, but he does not concern himself with the financial aspect of the question; he sees a danger and raises a "cry of alarm." Parliament should know what responsibilities it saddles itself with.

In similar language another cavalry officer, von Kleist, had already protested against the weak proportion of his arm in modern Armies.[1]

"To weaken or alter the nature of cavalry," he writes, "in order to reinforce, in the same proportion, the infantry and artillery, will be to cut the wings of the eagle in the vain hope that its claws will grow better."

With all these writers the same two ideas are repeated as a veritable *Leitmotiv*:—

1. The *rôle* of the cavalry has grown in importance.
2. The German cavalry ought to be increased.

No discordant voice has yet been raised. But in spite of this vigorous campaign, Parliament remains unmoved. The cavalry is expensive; it is the aristocratic arm of the service; its action, more moral than material, is hardly understood by the public.

However that may be, in competent circles the conviction exists that the military authorities will pursue the realisation of their scheme with the steadiness of purpose and by means of such artifices as are customary with them.

The formation of some squadrons of *Chasseurs à Cheval*,[2] actually to the number of 17, nominally intended to meet a new requirement, has only been a disguised increase of fighting units.

Since 1896, immediately after the creation of the first *Meldereiter*, it was freely stated in military circles that the reasons given in advance for the step were only flimsy pretexts. "We shall first demand, it was said, "the constitution of a squadron of this kind for each army corps; later on these squadrons will be united into regiments, repeating thus, with regard to Parliament, the tactics which were successful in bringing about the formation of new regiments of infantry under the form of fourth demi-battalions."

The prediction has been fully realised. Before they had even obtained from Parliament all the proposed squadrons of *Chasseurs à*

[1] "Die Offizier-Patrouille," Berlin, 1898.

[2] The "Meldereiter" (Despatch-riders) have been renamed "Jäger zu Pferde" since 1898.

Cheval, the military authorities, under the pretext of instructional necessities, have grouped these squadrons[1]; they have demanded the creation of regimental staffs, obstinately refused on the other hand by the Reichstag; majors, in default of "regimental chiefs," have been placed at the head of these groups, and we have seen, in 1902, the combined regiment of *Chasseurs à Cheval* of Posen attached to a division of cavalry taking part in the Imperial manœuvres.

One can well believe, therefore, that this remarkable pertinacity in following up the desired object will continue to bear fruit.

The superior authorities, more than ever convinced of the necessity of having a powerful cavalry, and determined to obtain an increase of the effectives, will, sooner or later, more or less completely, obtain it.

* * *

If there is complete unanimity with regard to the importance of cavalry, opinions differ with regard to its organisation. Pelet-Narbonne, Balck, and behind them the Press, demand the constitution of permanent divisions.

"We are only deceiving ourselves," says Pelet-Narbonne, "if we compare the work to be obtained in case of war from an improvised division with that which will be effected by a division well trained in advance." He reckons that 12 permanent divisions of cavalry, uniformly made up of 24 squadrons, are necessary. Moreover, each army corps should have at its own disposition a brigade of cavalry to ensure its security; the infantry division should simply have a squadron of *Chasseurs à Cheval* for orderly and escort duty. The army corps has become, as a matter of fact, the real unit; and it is its commander who ought to dispose of the cavalry charged with its safety.

Balck[2] shares the views of Pelet-Narbonne as to the necessity for permanent divisions. He only recommends making the necessary exchanges among regiments in order to avoid all specialisation.

Already, at an earlier date, Frederick-Charles had demanded the creation of permanent divisions, and both Verdy du Vernois and Schlichting held the same opinion.

Bernhardi, on the other hand, does not believe it to be wise to constitute cavalry divisions in time of peace, and pleads in favour of "Inspections."[3] He holds that the idea of a uniform constitution of these large units is wrong. "In each particular case," he maintains, "there ought to be a corresponding different grouping of forces."

"One may be for 'Divisions' or 'Inspections,'" writes an anonymous author in the *Militär Wochenblatt*. "What is certain is that the weakness of our cavalry arises from the fact that there do not exist in times of peace superior units to the brigade."

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[1] Of the 17 existing squadrons, 5 are grouped at Posen, and 6 others are grouped 2 and 2 at Graudenz, Langensalza and Chemnitz.

[2] "Taktik," Berlin, 1903.

[3] In the German Army, there is an Inspector-General of Cavalry, with four Inspectors to assist him, hence the term "Inspections." These Inspectors, in carrying out their duties, have, however, to act under the Generals commanding Army Corps, and in war-time, would command the four Cavalry Divisions, which would be formed. The only standing Cavalry Division is that of the Guards Corps, which has its own Divisional General. Six regiments, with two batteries of horse artillery, make up a division of Cavalry, two of which are formed each year for the Imperial Manœuvres

We shall see, further on, that if Bernhardi protests against the organisations of permanent divisions, it is not with the view of employing cavalry in small units.

Before Bernhardi, Prince Hohenlohe had already pronounced against the creation of cavalry divisions, from fear of seeing by degrees two cavalries formed, the one of the 1st class and the other of the 2nd class; he was also afraid of seeing the arm specialised.

It is to this prejudice the superior authorities seem to be yielding. In spite of the arguments advanced by the most competent authorities, in spite of the opinion of almost the whole cavalry, they have maintained up to now the principle of organisation in isolated brigades, and the attachment of these, in times of peace, to the infantry divisions.[1] However the regiments may be allotted on mobilisation, the brigades go in turn to make up the two or three cavalry divisions formed each year at the time of the manœuvres. The squadrons of *Chasseurs à Cheval*, even, although in theory intended for despatch-riders and escorts, are drilled in the same manner as other corps. The German authorities intend to have only one description of cavalry—excellent—and one understanding all the needs and weaknesses of the other arms by working constantly with them.

Perhaps we might find an explanation of the actual state of things from reasons of an entirely different order.

A true cavalry leader is rare.

He is frequently lacking in qualities he ought to possess.

In appointing, when the need arises, the commander of a cavalry division, there will be at least a fair measure of certainty, that one will be found possessing at least the requisite qualities of activity. However that may be, it can safely be affirmed that the maintenance of the actual organisation does not correspond with an intention of acting by brigades.

It is evident that unanimity, absent apparently, on the question of organisation, exists nearly entirely on the subject of the proper methods of employment.

* * *

The critics of the Press are, however, very much alive, when each year the Kaiser in person heads a charge of fifty squadrons against his infantry.

"The spectator, still astonished at the mad attempt of the cavalry," writes Pelet-Narbonne,[2] "is ere long stupefied on learning that the umpires have declared the attack to have succeeded."

But "the spectator does not evidently take into consideration the state of disorder into which a body of men may be considered to have been thrown."

On the subject of the check of the 38th German Brigade at Vionville, Fritz Hoenig admits: "A few active squadrons (of the enemy), and not a man would have escaped"; and he maintains: "At these moments it does not matter in the least whether these human phantoms are armed with repeating rifles, flint-lock muskets, or pitch-forks."

"The same thing happened," continues Pelet-Narbonne, "during the retreat of the Italians after the battle of Adowa. The

[1] Except in the Guard Corps, which, as already mentioned, possesses a Cavalry Division of four brigades.

[2] "Jahrbücher für die Deutsche Armee und Marine," November, 1902.

Abyssinian horsemen hurled themselves singly on the ranks of the flying Italian infantry, slaying them with their lances without meeting any resistance."

"*In the future, similar situations to the above will present themselves oftener than in the past.* First, the efficacy of the present rifle is so great, and the effect it produces so rapid, that in a few minutes very heavy losses can be inflicted on an enemy.

"Then, the short service system and infantry fighting formations will contribute to provoke panics.

"At the decisive moment of action, that is to say, at the final moment for attack, one only sees, as a matter of fact, long lines of skirmishers without serious reserves, and the influence of the few unwounded officers that remain must necessarily be very small. The want of war experience, common to all European Armies, will do the rest.

"*Then, if on the one hand the terrible efficiency of the modern fire-arm has rendered a cavalry charge much more difficult than formerly, on the other hand, the factors mentioned above are to a greater degree in its favour.*"

To the argument drawn from the South African War, Pelet-Narbonne opposes the opinion of the Boer general, Delarey. "As far as I am concerned," said the latter, "I owe my greatest successes, including the capture of Lord Methuen, to cavalry attacks."

Pelet-Narbonne also points out that on certain occasions (for instance, at Elandslaagte and at Kimberley) the English cavalry had made equally successful and decisive charges, and he asserts that "in every case the troops who yielded to these attacks were solid bodies, commanded by intrepid leaders."

"The man is always the same," writes Balck (an infantry-man), "and now, as formerly, sensitive to the impression produced by surprise; and he will be all the more so, as the fighting will last for a longer time and his nerves be subjected to a severer strain."

With regard to the Regulations, he affirms that "cavalry has only one mode of fighting, viz., the attack. It can, *even in face of the three arms*, penetrate up to the enemy's positions, sabre detachments, carry off guns."

This conviction the Kaiser endeavours more than ever to impress on the minds of his cavalry officers, and Bissing writes that: "They cannot be grateful enough to him for so doing."

It is held, moreover, even by the innovators, that attacks by small bodies of cavalry, acting on the spur of the moment, have still chances of being successful. It is the employment on a grand scale of masses of cavalry in battle which provokes the indignation of these latter.

"Assuredly," replies Pelet-Narbonne, "the attacks by small bodies can more often be carried out than those executed by large masses. They are easier to lead, give a better chance of surprising the enemy, and may achieve partial success; but cavalry can only intervene in a decisive manner in a battle if they charge in several successive lines, or if they combine a frontal with a flank attack. This requires a considerable force. . . . ."

"Large masses of cavalry possess by themselves, and better than formerly the means of diverting the enemy preparatory to an attack before launching themselves upon him with the cold steel, or of supporting the other arms in their efforts by bringing into action

their horse artillery and mitrailleuses batteries, and even by using the carbine fire of their men.

"*We see, then, that the corps and divisions of cavalry of the present day are the units which combine in themselves the possibilities of action of the three arms to a much greater degree than during the campaign of 1870,*" and that these units are able to bring these means of action to bear in an unexpected and decisive manner for deciding the issue of a battle.

"It results from all this, that it is indispensable to train cavalry to attack in large masses, if we wish such attacks to be successful, when they have to be made in earnest. . . . . .

"The permanent creation of cavalry corps would not appear necessary, nor even rational; but the temporary combination of considerable masses of cavalry, placed under the orders of a single head, presents no inconvenience when the question of carrying out a clearly defined object is at stake.

"Masses of cavalry," writes Bissing in his turn, "would have produced great results in recent wars if a Seidlitz had been at their head. But if some commanders of cavalry like Seidlitz owe their immortal success to their talents being developed by practice, it is necessary, if these talents are to show and develop themselves, that opportunities for practice should be given in time of peace. . . ."

The Regulations, finally, sum up and affirm these same ideas:—

"To carry out the attack there should be a combination of all arms. It will be in this case particularly advantageous to unite masses of cavalry (several divisions) and to make them act in concert. . . . ."

The term "*masses,*" which is used continually by German writers, does not imply by any means the idea of "*massed formations.*"

The misunderstanding which has arisen sometimes on the subject of infantry attacks should not crop up again.

We want large masses in order to be able to dispose, at the decisive point, of *powerful resources*, so as to be able to at once deceive the troops within whose range of vision the terrain of the attacks falls, to be able to develop, as Pelet-Narbonne calls it, "the means of action of the three arms."

These masses will only be some *reservoirs of forces*, permitting action by powerful fire, repeated attacks on front and flank, until disorder has been produced, leaving thus to the chief, up to the last moment, sufficient forces to make the most of success. The cavalry, it is well understood, would only act in a manner suited to its actual armament; *approche défilée*,[1] loose formations, rapid deployments.

It may be worth while to recall that the instructions given before the cavalry manœuvres at Rethel in 1903 were praised without reserve by the German Press.

To resume, the desire finds expression everywhere in Germany for large masses of cavalry, which can intervene in battle, contribute to success, and perhaps be able to snatch victory.

And in order to make his cavalry long to emulate the exploits of Seidlitz, the Kaiser in person leads fifty squadrons to the attack, on the same plain of Rossbach.

(*To be continued.*)

[1] *Approche défilée*, an advance covered by a clever use of the accidents of the ground.

NAVAL NOTES.

HOME.—The following are the principal appointments which have been made: Captains—F. L. Campbell, to "Majestic"; A. M. Farquhar, C.V.O., to "Magnificent."

The Royal Visit to Kiel.—His Majesty embarked on board the "Victoria and Albert," at Port Victoria, on the evening of the 23rd, and proceeded to Kiel, escorted by the first-class armoured cruisers "Essex" and "Bedford," the second-class cruisers "Dido" and "Juno," and the destroyers "Cherwell," "Greyhound," "Dove," "Roebuck," "Falcon," and "Racehorse." The Royal Yacht arrived at Brunsbüttel at 11 p.m. on the 24th, and moored for the night in the lock at the entrance to the Kaiser Wilhelm Canal, and with the escorting flotilla passed through the Canal the next day, arriving in Kiel harbour the next afternoon at 3 o'clock, unfortunately in bad weather.

The German Fleet assembled at Kiel to do honour to his Majesty consisted of the following ships:—

First-class battle-ships—"Kaiser Wilhelm II." (flag-ship of Admiral von Koester, commanding the Active Fleet), "Kaiser Friedrich III.," "Kaiser Wilhelm der Grosse," "Kaiser Karl der Grosse," "Mecklenburg," "Wittelsbach," "Zähringen," "Wettin," "Schwaben."

Fourth-class battle-ships—"Hildebrand," "Beowulf," "Frithjof," "Odin."

First-class armoured cruisers—"Prinz Heinrich," "Prinz Adalbert," "Friedrich Karl."

Third-class cruisers—"Hamburg," "Nymphe," "Ariadne," "Medusa," "Niobe," "Amazone," "Frauenlob," "Arcona."

Despatch-vessels—"Blitz," "Pfeil," "Sleipner."

Training frigates—"Stosch," "Stein," "Moltke."

Gunnery Training-ship—"Mars," with her three tenders.

Torpedo-depôt-ship—"Pelikan," with three torpedo-boat divisions.

The King left, on his return to England, on the morning of the 30th a little before seven, passing as before with his escorting squadron, through the Kaiser Wilhelm Canal, and arrived at Port Victoria about 11 o'clock in the forenoon of 1st July.

Rear-Admiral F. C. Bridgeman hoisted his flag on board the "Victorious," at Devonport, on the 25th ult., in succession to Rear-Admiral the Hon. H. Lambton, C.V.O., C.B., as second-in-command of the Channel Fleet.

The first-class battle-ship "Illustrious" arrived at Sheerness on the 17th ult. from the Mediterranean, and is to be transferred to the Channel Fleet. The new first-class battle-ships "Triumph" and "Swiftsure" commissioned on the 21st ult. for service with the Home Fleet.

The first-class armoured cruiser "Donegal," left Plymouth on the 7th ult. for Gibraltar, where she arrived on the 12th, and joined the

Cruiser Squadron. The first-class armoured-cruiser "Lancaster" left Portland on the 23rd ult. for the Mediterranean, arriving on the 27th ult. at Gibraltar, where she relieved the second-class cruiser "Astræa," which has since proceeded to China, where she will relieve the second-class cruiser "Eclipse." The first-class armoured cruiser "Suffolk," which was originally commissioned for the Channel Fleet, has left Portland for the Mediterranean, where she will relieve the second-class cruiser "Hermione," which returns to England to pay off. The first-class cruiser "Terrible" commissioned at Portsmouth on the 21st ult. for relief service; she takes out new crews for the first-class battle-ship "Albion" and the river gun-boat "Robin," on the China station, which are to be re-commissioned at Hong Kong, and left on the 1st inst. for her destination. The first-class cruiser "Gibraltar," late flag-ship at the Cape, paid off on the 17th ult. at Portsmouth. The first-class cruiser "Royal Arthur," late flag-ship in Australia, paid off on the 30th ult. at Portsmouth.

The second-class cruiser "Minerva" commissioned on the 9th ult. at Devonport for the Mediterranean, and left on the 26th ult. for her destination, where she relieves the second-class cruiser "Naïad." The third-class cruiser "Mohawk" arrived at Plymouth on the 6th ult. from the East Indies, and is to pay off at Chatham.

Naval Manœuvres.—The following battle-ships are to be specially commissioned for the forthcoming "Tactical Exercises," in which the Home and Channel Fleets and Cruiser Squadron, with the ships named below, will take part :—

First-class battle-ships—"Canopus," "Goliath," "Ramillies," "Resolution," "Renown," "Barfleur."
Second-class battle-ship—"Howe."
Second-class cruiser—"Highflyer."

The Depôt-ships "Devastation," "Dreadnought," and "Hero" will also be specially commissioned.

Altogether at least twenty-three battle-ships, eight first-class armoured cruisers, two first-class protected, and five second-class cruisers will form the opposing fleets. The six second-class cruisers under the orders of the Admiral-Superintendent of Reserves will also probably be added, and there will be several torpedo-gunboats, some seventy-five destroyers, and thirty-seven torpedo-boats, with a flotilla of submarines; the manœuvres for the torpedo-craft being held in the Irish Sea.

Three additional rear-admirals have been appointed for service during the manœuvres—viz., Rear-Admiral R. L. Groome, who will hoist his flag in the "Canopus"; Rear-Admiral Sir R. Poore, Bart., who will hoist his flag in the "Ramillies"; and Rear-Admiral C. G. Robinson, who will hoist his flag in the "Highflyer."

Loss of the "Sparrowhawk."—Information has been received that the destroyer "Sparrowhawk," attached to the China Fleet, struck on the 19th ult. on an unknown rock near Chesney Island at the mouth of the Yangtse, and has become a total wreck; no lives were lost.

Launch of the "Duke of Edinburgh."—The first-class armoured cruiser "Duke of Edinburgh," which was launched at Pembroke Dock on the 14th ult., is the first of the new class of armoured cruisers to take the

water, the remaining five being the "Black Prince," "Achilles," "Natal," "Warrior," and "Cochrane." These cruisers represent a type which has been evolved as the result of experience gained with a succession of armoured cruisers, commencing with the "Drake" and "Cressy" classes, and passing on to the "Monmouth" and the improved "Monmouth," or "Devonshire" type. The weakness of all the vessels named consisted chiefly in the adoption of the 6-inch B.L. gun as the preponderating arm. In the "Duke of Edinburgh" the 6-inch gun is retained on the main deck, but her design provides for six 9·2-inch guns to be mounted in barbettes on the upper deck; one forward, one aft, and two on each broadside. This powerful armament, and the fact that these vessels will be the first cruisers to have a complete armour water-line belt are the most important distinctive feature of the "Duke of Edinburgh" and her sisters. The remaining armament will comprise twenty-four 3-pounder Q.F. guns, with four machine guns. The full armament of the ships will therefore be six 9·2 B.L., ten 6-inch B.L., and twenty-eight smaller guns. This represents an enormous increase in offensive power over that possessed by any previous cruiser. In this connection, also, she is possessed of a new feature in the shape of a centre line submerged torpedo tube. Years ago it was customary to fit stern tubes above water, but they were abandoned because of difficulties experienced in directing the torpedoes. Latterly, however, a new invention has removed that difficulty, and hence the "Duke of Edinburgh" is to be fitted with a stern submerged tube. She will also have one submerged tube on each side near the bow. All three will discharge 18-inch torpedoes.

It is reported that in the four last laid down vessels of this class, the "Achilles," "Natal," "Cochrane," and "Warrior," the ten 6-inch guns on the main deck are to be done away with, and four additional 9·2-inch will take their place on the upper deck, but this seems doubtful.

The principal dimensions of the "Duke of Edinburgh" are:—Length, 480 feet; extreme beam, 73 feet 6 inches; mean draught as designed, 27 feet (her actual draught when complete will probably be about 9 inches more); displacement, 13,550 tons. The estimated weight of the hull, when complete, is 8,015 tons. There is a complete armour water-line belt 6 inches thick amidships, tapering to 4 inches forward and 3 inches aft; the 3-inch and 4-inch armour extends only from the lower to the main deck, but the 6-inch will be carried to the upper deck, and superimposed on the main deck at the points forward and aft where the 6-inch armour terminates. Athwart-ships, armour bulkheads 6 inches thick will be fitted between the main and upper decks, which, with the side armour, will form a central citadel. The lower deck of the ship is curved downwards towards the sides forming an arch throughout. It is built of two thicknesses of $\frac{3}{8}$-inch plating. The main deck within the citadel is formed of a single thickness, but outside it at both ends it is worked in two thicknesses of $\frac{1}{4}$-inch plating for protective purposes. The upper deck over the citadel is built of two thicknesses of $\frac{3}{8}$-inch plate, but beyond it towards both ends it is worked in single thickness. The plating of the top sides, where there is no armour and aft, is $\frac{7}{16}$-inch thick.

Above the upper deck, terminating at about the same point as the thick side armour, a superstructure will be erected, which will be carried forward to form a boat deck. A similar superstructure will be erected above the forecastle, also at about the point where the thick side armour terminates forward. Twenty of the 3-pounder guns will be mounted on these superstructures, ten forward and ten aft. Along the sides, but at some distance from them, hammock berthings will be built, thus connecting

the aftermost superstructure with the forecastle. On the upper deck abaft the superstructure, and on the forecastle immediately before it, the barbettes for two of the 9·2-inch guns formed of 6-inch armour, and built on a strong substructure, erected upwards from the lower deck, in each of which one 9·2 gun will be mounted, will be constructed. These guns will have an arc of fire of 270 degrees. At the four corners of the central citadel on the upper deck similar barbettes will be constructed, and in each of these the other 9·2-inch guns will be mounted. The aftermost of these guns on both sides will fire 2 degrees across a fore and aft line, and, in order to permit of this, the top side plating above the main deck has been recessed back to form a lengthy embrasure. Beneath these corner 9·2-inch guns 6-inch guns will be mounted on the main deck, and the two after ones will have a similar range to the larger guns above them. Between the foremost and aftermost 6-inch guns, at equal distances along both sides, three other 6-inch guns will be mounted, all at ports, and all having a range of 120 degrees.

The interior of the ship is divided into compartments on much the same lines as other ships. The boiler and engine-rooms occupy the middle part below the lower deck, and the magazines, shell-rooms, and store-rooms are at the extremities. The lower coal bunkers skirt the boiler-rooms along the sides, and the ammunition passages, which afford communication with the principal magazines and shell-rooms, and the tubes through which the ammunition is passed to the fighting positions, occupy the inner upper corner of the coal bunkers on both sides. Three passages contain a novel feature. Immediately under each of the broadside guns, magazines and shell-rooms to contain ammunition for "ready use" are to be constructed. These compartments will considerably reduce the coal capacity of the bunkers, but this point is apparently considered of comparatively little importance, as the inter-bottom spaces on both sides throughout the entire length of the boiler-rooms and below the second longitudinal have been constructed to carry oil fuel. The coal capacity of the ship is estimated at 1,000 tons.

On the main deck aft, the officers' cabins and the wardroom will be situated; in the middle part, the central citadel, in which the 6-inch gun positions will be separated by 2-inch splinter bulkheads, and forward, a portion of the crew will be accommodated, the remainder being located on the upper deck in the forecastle.

The ship will have two masts and four funnels. She will be lighted throughout with electricity, and ventilated by electrically driven fans, distributing air through a system of pipes.

The propelling engines, which have been manufactured by Messrs. R. and W. Hawthorn, Leslie, and Co., Newcastle-on-Tyne, will consist of two independent sets of vertical triple expansion engines, each having four cylinders, of which the diameters will be:—High pressure, 43½ inches; intermediate pressure, 69 inches; and low pressure (two in number), 77 inches. The engines will have a 3-foot 6-inch stroke, and will make approximately 135 revolutions to the minute. Their united H.P. will be 23,500, and the estimated speed of the ship is 22·33 knots. In addition to the main engines, the contractors are supplying two complete sets of evaporating and distilling machinery by Caird and Rainer; four engines and pumps for circulating water through the main condensers, four in number; two steering engines by Bow McLachlan; four main and four auxiliary feed pumps by Weir, Glasgow; a complete electric installation,

consisting of engines, by Brotherhood, and Lawrence Scott dynamos, probably six in number; two sets of air compressing machinery by Brotherhood, electrically driven; and one electrically-driven ice machine by J. and E. Hall, Dartford. The boiler installation will comprise 20 Babcock and Wilcox water-tube and six cylindrical boilers, the latter being 13 feet 6 inches in diameter, and 10 feet 6 inches long. Both sets of boilers will work at a pressure of 210 lbs. to the square inch.

The estimated cost of the "Duke of Edinburgh" is £1,131,882.

FRANCE.—The following are the principal appointments which have been made: Rear-Admiral—M. A. Massé for service on the Staff at Cherbourg. Capitaines de Vaisseau—J. Baëhme to "Duguay-Trouin"; G. Paupie to Kléber. Capitaine de Frégate—N. C. M. Thoret to "Lévrier" and command of *Défense-Mobile* in Corsica.—*Journal Officiel de la République Française.*

A new Naval Division.—By a Presidential decree of the 28th ult. a Naval Division of Algeria has been formed, and will comprise the ships stationed on the Algerian coast (the *Défenses-Mobiles*, fishery protection service, etc.). The Division will be constituted from 10th July.

The Rear-Admiral Commanding the Navy in Algeria is to be the Commander-in-Chief of the Division, while still continuing to carry on his old duties; he will hoist his flag on board the destroyer "Pique" on the 10th inst., on which vessel will be borne also his Chief of Staff and other members. Rear-Admiral De Percin is the flag officer at present in charge in Algeria.

The Deficiency of Men.—With reference to the reported deficiency in the number of men required for manning the French Fleet, the *Temps* states: "We affirm and have proved that our squadrons were not in a fit state to go into action by reason of a lack of men. That during the time of tension which preceded the outbreak of the Russo-Japanese war our Fleet in the Far East never had the full number of men voted in the 1903 Budget."

The officials at the Ministry of Marine state the contrary, and M. Pelletan himself spoke as follows before the Commission of the Budget:—

"I have not quite understood on what distinct points fault is found with the composition of the crews of our ships. Anyhow, I should like to see the objections put down in black and white; it will be easy for me to show that I have not weakened in the least degree the strength of any of our squadrons."

This declaration of the Minister is contradicted by the report of Admiral Campion, where we read: 49,905 men were voted by Parliament in 1903; 49,685 were actually borne, showing a deficiency of 200 men. 27,525 men were voted for ships in commission; 25,179 were actually borne afloat, showing a deficiency of 2,346 men.

These differences are made up as follows:—

1. Mediterranean Fleet.—Numbers allowed as per complements, 6,853 men; mean number borne, 5,700 men.
2. Northern Squadron.—Number allowed, as per complement, 4,491 men; number actually born, 3,500 men.
3. Squadron in the Far East.—Number allowed, as per complement, 3,050 men; number actually borne, 2,700 men.

Admiral Campion's tables further show the singular manner M. Pelletan employs of utilising the men voted; instead of there being 5,300 men in the depôts, the strength there has been maintained at an average of 7,126 men, or an excess of 1,826.

What can be thought of a method of administration which diminishes the number of men actively employed at sea at the expense of the ships in commission and increases the number in the depôts?"

Steam Trials.—Some new regulations for the steam trials of new ships have been issued, and are as follows:—

1. Coal consumption trial with fires lighted under half the boilers to last six hours.
2. Two trials, one at full speed for ten hours, and a second for three hours at the highest speed obtainable with three-fourths of the boilers in use.
3. A run of twenty-four hours at economical cruising speed.

Unless under special circumstances, which are to be reported to the Minister of Marine at the time, the time between two trials is not to exceed three days. The order in which the trials are to be taken is to be a matter of arrangement between the Trials Committee and the contractors.

The new first-class armoured cruiser "Condé" has successfully completed her trials, and is the first ship to have practically run them under the new conditions. Her trials really commenced on the 23rd March, but they had to be given up owing to the leaky condition of her condensers; the necessary repairs occupied some six weeks, but when completed, the trials were carried through in seven days. Under the old system the trials of new ships often ran over several weeks and even months before they were completed. The "Condé" is a ship of 10,014 tons displacement, with engines, according to the contract, developing 20,500-I.H.P., to give a speed of 21 knots. At the full-speed trial the engines developed a mean of 22,175-I.H.P., and a maximum of 22,800, an excess over the contract of over 2,000-H.P., the speed being 21·4 knots, with a coal consumption of 148 kg. (326·19 lbs.) per square metre of grate surface. At the 24 hours' run at 10,000-H.P., the engines actually developed 9·900-I.H.P., giving a speed of 18·6 knots, with a coal consumption of 734 gr. (1·46 lbs.) per H.P. per hour.

The coast defence battle-ship "Furieux," which has been undergoing extensive repairs and alterations at Cherbourg, has made a successful preliminary trial of her boilers and machinery, as she has been fitted with Belleville boilers with economisers in place of her old cylindrical boilers, and can thus work at higher pressure; with eight boilers in use the engines developed 2,133-I.H.P., with a coal consumption of 54 kg. (119·016 lbs.) per square metre of grate surface per hour.

The new destroyer "Sabre" has successfully completed her trials at Rochefort; with the engines developing 6,500-I.H.P., the mean speed during her full-speed trial was 29·7 knots, more than a knot and a half over the contract, the coal consumption being 689 gr. (1·37 lbs.) per H.P. per hour. A sister vessel, the "Baliste," has also concluded her trials; at her coal consumption trial, with the engines making 219 revolutions and developing 4,000-H.P., a speed of 18·4 was maintained with a coal consumption of 877 gr. (2·34 lbs.) per H.P. per hour.

The new first-class armoured cruiser "Kléber" has now completed her trials; at the final coal-consumption trial at 4,500-I.H.P., the engines

actually developed 5,040-H.P., giving a speed of 15·6 knots, with a coal consumption of 770 gr. (1·54 lbs.) per H.P. per hour.

In view of the discussions in England which still continue over the merits or otherwise of the Belleville boiler, it is interesting to note that in French naval circles warm approval is expressed at the action of the Minister of Marine in deciding on that type of boiler for the new battle-ships "Démocratie" and "Vérité," now building at Brest and Bordeaux respectively. The contract for the boilers has been signed; each ship will carry twenty-two, which are to develop 18,000-I.H.P. It is noteworthy also of remark that the Belleville type of boiler is the most popular type of water-tube in the French Navy, and has always given excellent results.—*Le Yacht*, *Le Temps*, and *Le Petit Var*.

The Naval Estimates for 1905. — The Naval Estimates demanded for next year, which have been laid before the Chamber of Deputies, amount to 318,068,813 francs (£12,722,752 10s.), as against 312,828,637 francs (£12,513,145 10s.), voted for the current year, showing an increase of 5,240,176 francs (£209,607).

The principal items are as follows :—

	Proposed 1905.			Voted 1904.	
	Francs.	£	s.	£	s.
Ministry of Marine	3,519,451	= (140,778	1)	140,778	1
Officers' Pay	10,271,438	(410,857	10)	410,857	10
Men's „	40,182,622	(1,607,304	18)	1,559,304	18
Ordnance Staff	1,505,934	(60,236	4)	60,236	4
Construction	5,552,814	(222,112	12)	222,112	12
Naval Commissariat	1,136,094	(45,443	17)	64,947	1
Medical and Religious Staffs	1,825,344	(73,013	17)	73,013	17
Administration of the *Inscription Maritime*	3,416,611	(136,664	10)	136,664	10
Hospitals	2,326,441	(93,057	15)	93,057	15
Victualling	13,757,615	(550,304	14)	560,000	0
Transport Service...	4,442,000	(177,680	0)	142,400	0
Fisheries and Commercial Marine	1,092,799	(43,711	19)	41,711	19
Subvention to the *Invalides de la Marine* ...	12,050,000	(482,000	0)	472,981	8
Secret Service	100,000	(4,000	0)	4,000	0
New Construction.					
Dockyards ... Wages.	11,948,000	(477,920	0)	481,362	8
Dockyards ... *Matériel*	38,347,000	(1,533,880	0)	1,576,000	0
Dockyards ... Miscellaneous expenses ...	12,975,629	(519,025	4)	530,372	17
Private Yards	51,500,000	(2,060,000	0)	1,949,600	0
Maintenance of Fleet and Repairs.					
Dockyards ... Wages	5,103,000	(204,120	0)	200,674	12
Dockyards ... *Matériel*	7,936,000	(317,440	0)	340,000	0
Private Yards	1,000,000	(40,000	0)	40,000	0
Ordnance.					
New Guns, Repairs, etc.	18,158,150	(726,326	0)	693,980	16
Gunnery Schools	5,330,000	(213,200	0)	216,800	0
Miscellaneous Expenses	3,422,600	(136,904	0)	158,904	0
Torpedoes and Electricity ... Wages	677,274	(27,090	19)	27,090	19
Torpedoes and Electricity ... *Matériel*	4,095,500	(163,820	0)	163,820	0
Torpedoes and Electricity ... Miscellaneous	355,029	(14,201	3)	15,601	3

DOCKYARDS AND NAVAL BASES.

	Proposed 1905. Francs.	£ s.	Voted 1904 £ s.
Improvement of Plant, etc. (Bill 2nd March, 1901)	2,840,000	(113,600 0)	113,600 0
Hydraulic Works, etc.	2,990,373	(119 614 18)	121,067 5
Deepening of the Charente	250,000	(10,000 0)	10,000 0
Extraordinary Expenditure on Improvement of Plant, etc. (Bill 2nd March, 1901) ...	14,147,942	(565,917 15)	553,917 15
Do. Hydraulic Works, etc.	1,629,177	(65,167 2)	65,967 2

Supplementary Estimates.—A supplementary vote for 9,581,200 francs (£383,248) has been submitted to the Chamber by the Ministry of Marine.

This credit is divided into two parts :—

1. 1,479,200 francs (£59,168) for extra vessels commissioned to strengthen the French Fleet in the Far East.
2. 8,872,000 francs (£354,880) for supplies of coal, munitions of war and extra accommodation at the *points d'appui*.

Personnel of the Fleet.—The following are the numbers of the officers of different ranks on the Active List of the Fleet :—15 Vice-Admirals; 30 Rear-Admirals; 125 Captains; 215 Commanders; 754 Lieutenants; 420 Sub-Lieutenants; 170 Midshipmen; and 67 Cadets, making a total of 1,796, of which number 1,279 are actually serving at sea.

The Engineer Department consists of :—1 Inspector-General; 6 Engineer-Inspectors; 20 Engineers-in-Chief; 100 Chief-Engineers, 1st Class, and 200 2nd Class, making a total of 327.

The Medical Branch consists of :—1 Inspector-General; 5 Directors; 30 Doctors-in-Chief; and 373 other Medical Officers of various grades.

The Accountant Department consists of :—1 Commissary-General, 1st Class; 3 Commissary-Generals, 2nd Class; 18 Commissaries-in-Chief, 1st and 2nd Class; 30 Principal Commissaries; and 136 other officers of various grades.

There are 82 Chief Warrant Officers; 33,186 Warrant and Petty Officers and Seamen; 14,692 Engine-room Artificers, Leading Stokers, and Stokers; 386 Armourers; 353 Bandsmen; and 1,057 men for special duties, making a total of 49,756, showing an increase of 2,003 over this year's effectives, which number 47,671.

In his explanatory statement, M. Pelletan, the Minister of Marine, points out that there are now at Toulon, ready for immediate service, nine first-class battle-ships, with three of the newest armoured-cruisers, exclusive of smaller vessels, and destroyer flotillas, six of the battle-ships forming the Active Mediterranean Fleet, and the remaining three the Reserve Division. The composition of the Squadron of the North remains the same as at present, viz., three first-class battle-ships, three coast-defence battle-ships and three of the latest armoured cruisers, exclusive of smaller vessels and destroyers; but a Reserve Division of three modern armoured cruisers is to be added, so that at the outbreak of war, six fast cruisers can be despatched forthwith into the Atlantic, more powerful than any other country can put into line against them, with the exception of England. The Minister repeats the statement he made last year, that France is not in a position to maintain, as some of the other Powers are able to do, a squadron of battle-ships in the Far East; the squadron in those seas, however, would remain composed of three new armoured cruisers, and

three fast protected cruisers, and this force was now in course of being strengthened by a flotilla of six destroyers.

"Important additions have, however," says M. Pelletan, "been made to the *Défenses-Mobiles*, both in the number of the small vessels composing them and in their improved fighting value. With the beginning of 1905, the entry on service of new units, both torpedo-boats and submarines, will provide the *Défenses-Mobiles* with the necessary means for making both day and night attacks; while the completion of a considerable number of submarines will permit of a proper distribution of these new and formidable engines of war, which up to the present have been necessarily practically retained at the ports where they have been constructed.

"With regard to the constitution of the *Défenses-Mobiles*, these are divided into two classes. The one, limited in number, is destined to undertake offensive action from specially selected *points d'appui* on the seas which bathe our European and North African shores, and the most powerful of the new units, those which have the greatest radius of action and are the best armed, are destined for this duty. In the Channel, Cherbourg, and Dunkerque will be the two principal *points d'appui* of the *Défenses-Mobiles*, the submarines for the last-named base being stationed at Calais, as the entrance to Dunkerque is difficult for these little vessels. In the Mediterranean, the two chief centres will guard the coast of Provence, the north of Corsica, and the intervening expanse of sea; while on the African littoral Bizerta and Oran will be the two centres from which the coast between these two points will be guarded. There are far from being at the present time enough powerful torpedo-vessels and submarines of sufficiently large tonnage to complete these offensive centres. Steps are being taken, however, to reinforce the *Défense-Mobile* at Bizerta, and the first submarines are being stationed at Calais, while, moreover, between the divers points mentioned above, the larger submarines of the "Cicogne" class, which have been recently, or are being now, completed, are being distributed.

"The completion of the small submarines of the "Naïade" type, will permit of the establishment of defensive centres at different points of the coasts, more particularly those of France's oversea possessions, where the troops being few, it is necessary to take all possible precautions against attacks, or attempts at landing. For this duty these small submarines are fitted, as it will not be necessary for them to move far from their base, provided they are not detailed to protect too extended a portion of coast-line. Ajaccio and Bonifacio have received their first submarines, as also has Bizerta; while in Tunis, stations for torpedo-flotillas and submarines have further been provided at the Goulette and at Sfax; the latter port seems hardly central enough, and the Goulette and Susa seem to be the stations most conveniently placed on an outbreak of war.

"Comparatively speaking, quite recently, Saïgon was the only one of the colonies provided with a *Défense-Mobile*. Last year the necessary work for making it a base was commenced at Diego Suarez, in Madagascar, and provision is now made in the Budget for stations at Cape St. James, at the mouth of the Saïgon river, one in Tonquin, and a third at a spot not yet finally determined on; each of the above-named stations will be provided with two submarines, as will Dakar on the west coast of Africa later on."

Coming to the vote for new construction, M. Pelletan states:—"There is an increase of two millions and a half (£100,000) in the amount

devoted to new construction, and even this is hardly sufficient. At the end of four years, the huge battle-ships of the 1901 programme still weigh heavily on the Budget, and absorb a large part of the vote for building purposes, which amounted in 1904 to 87 millions (£3,480,000). In 1905, 41 millions (£1,640,000) is required for the six battle-ships of the "Patrie" class, and nearly 25 millions (£1,000,000) for the armoured cruisers of the "Gambetta" type. Only six and a half millions (£260,000) are taken for the two new ships which must be laid down over and above the programme of 1901, unless laying down new ships is to come to a stop altogether. The last cruiser of the earlier type, the 'Dupetit Thouars,' will require a further expenditure of 1,500,000 francs (£60,000), owing to alterations which have been made, and delays in completing her. Nearly 68 millions (£2,720,000) of the whole building Vote is thus being expended on ships of large displacement.

"There remains, therefore, but little for the destroyer flotillas, torpedo-boats and submarines. Yet it is on these flotillas that we place a large amount of our reliance in case of a naval war; they are particularly indispensable for the security of our distant possessions, and it would have been specially desirable to be able to constitute them as rapidly as possible. What is now taking place in the Far East shows what will be the rôle of the torpedo in future wars; and at a time when the construction of large armoured ships absorbs two-thirds or three-fourths of our available funds, we see similar vessels sunk in an instant by the sting of a minute engine, concealed beneath the surface of the sea.

"It is impossible under existing conditions to devote to the construction of our flotillas such a sum as we should like to do. We are, however, asking nearly 23 millions (£920,000), and although this is an increase of two millions and a half (£100,000), it is far from being enough to give us all we require.

"The destroyers, provided for in the 1901 programme, are to-day either constructed or in course of being so, but their number is quite insufficient. For not only are we obliged to attach destroyers to our squadrons, but the time would seem to have come to assign a new rôle to them. Destroyers are only large torpedo-boats, and they are the only ones in this class of torpedo-carrying vessels which can face a sea or venture far from the land; they seem then called upon, in the *Défenses-Mobiles*, to which are reserved an offensive rôle, not only to serve to-day as the leaders of a group of smaller vessels, but also to form entire divisions, capable of undertaking operations more or less distant from their base. Great Britain counts her destroyers by the hundred, and is still building them; we have to content ourselves with forty.

"Nor have we enough torpedo-boats. We require several new ones to replace the obsolete ones, of which we have far too many in our *Défenses-Mobiles*, and although they may only be used for drill purposes, yet they ought to have been condemned years ago. We must have more, not only to increase our existing *Défenses-Mobiles*, but to create new ones in our oversea possessions, where they are so necessary, and where we have so few.

"Finally, and above all, it is necessary to insist on and make people understand the importance of hastening on the creation of our fleet of submarines. It must be remembered that they must be sufficiently powerful to allow of their not being tied to the coast, and of their undertaking operations at a distance, and such vessels will naturally be costly. Those

now under construction represent each an expenditure of 1,250,000 francs (£50,000). Costing as much as they do, laying down six each year represents a considerable effort, and it can be realised how long it will take to create an important flotilla. If we merely undertake the construction of submarines for purely defensive purposes, the cost of the units will not be so great, but the building a sufficient number of them will require a considerable sum.

"The following table shows the amounts expended expended on torpedo-boats and submarines yearly, since 1895 :—

	Francs.	£ s.
1896	2,500,411 =	(100,016 10)
1897	4,293,922	(171,756 18)
1898	5,267,315	(210,692 13)
1899	8,526,341	(341,053 13)
1900	7,985,680	(319,427 4)
1901	11,723,433	(468,937 7)
1902	10,038,523	(401,540 18)
1903	10,132,219	(405,288 17)
1904	19,025,646	(761,025 19)
1905 (Budget)	22,900,476	(916,019 1)

"The increase in the Estimates already alluded to has prevented any additional sums being devoted to the *Points d'appui* of the fleet. But as far as our resources will allow, work is being pushed on in all directions, notably with the construction of the new docks at Brest, which have been rendered imperatively necessary, in order to accommodate the new ships with their largely increased dimensions; the new docks open on to the harbour, and the numerous risks, which attended the passage of ships to the old docks, through the narrow Penfeld Channel, will be avoided.

"The works at Bizerta are now on the point of being completed; two docks, among the largest in the world, will be open very shortly. The canal giving access to the inner harbour with the moles and breakwaters, which protect the entrance, are also on the point of completion. This advanced state of things allows more money being expended at other points in our Asian and African possessions.

"At Dakar, the works have, for some years, been considerably delayed. First through the epidemic of yellow fever, the evil effects of which were felt for some time afterwards; next owing to difficulties between the Government and the contractors, resulting in a failure in the supply of *matériel*. Matters are now proceeding more smoothly, but there is a sum of eleven and a half millions (£460,000) still to be expended, of which some three millions (£120,000) will probably be spent in 1905; the whole work should now be completed according to the terms of the contract. Steps are being taken that the new dry dock should be completed as quickly as possible, and the new dry dock at Diego Suarez is also to be hurried on. The necessary works are also in hand for pushing on the establishments at the oversea bases for the maintenance and repairs of the torpedo flotillas, etc., which are to be stationed at them."—*Budget des Dépenses du Ministère de la Marine, 1905.*

GERMANY.—*A New Naval Station.*—A new naval port is being created in the Baltic, at Sonderburg, on Alsen Island, which faces the Düppel plateau. For some time past, the question has been considered of establishing a new station for the gunnery training-ships, which originally, with their head-

quarters at Wilhelmshaven, have recently been transferred to Kiel. There were many inconveniences attached to the use of Wilhelmshaven as a training centre owing to the numerous interruptions to target practice, caused by the bad weather so often experienced in the North Sea. Moreover, much time was lost in the passage from Wilhelmshaven before the open water, where the practice could be carried on, was reached, and communications with the shore were often difficult, owing to the strong tides.

The transfer of the ships to Kiel removed most of these inconveniences, but soon the relatively-speaking small dimensions of the bay, the continual presence of a considerable part of the German Fleet, with the constant arrivals and departures of numerous merchant-vessels, introduced new causes of delay. The naval authorities therefore determined on finding some point on the north coast, where greater facilities for carrying on the work of the school would be afforded, and Sonderburg has been found to offer the necessary *desiderata*. The gunnery training-ships "Mars," "Carola," "Olga," "Freya," "Ulan," and "Hay" have been transferred there, and barracks for the officers and petty-officers of the training staff are being constructed, as for the future the ships will only return to Kiel for overhaul and repairs.

Progress with the Battle-ship Programme.—Of the new battle-ships of the "Braunschweig" class, which have a displacement of 13,200 tons, five are now afloat, one more will be launched this autumn, and two others will shortly be commenced. The "Braunschweig," the first of the class, with the "Elsass," was voted in the Estimates for 1901, and both ships were laid down in October and November, respectively, of that year, and launched, the first in December, 1902, and the second in May, 1903; it is probable that both ships, which are being built by contract, will be ready for acceptance by the naval authorities before the end of the year, when they will be commissioned and take the place, in the 2nd Squadron of the Active Fleet, of two of the small fourth-class battle-ships, which at present form the 2nd Squadron. Two more, the "Preussen" and "Hessen," were voted in the Estimates for 1902, laid down in the latter part of that year, and launched in October and August of last year, respectively. The "Lothringen," and her sister-ship "N," voted in the 1903 Estimates, were laid down on the last day in March of last year, the first named taking the water on the 27th May last. In spite of the increasing size of the ships, the time taken in their construction is becoming perceptibly shorter, as there is a steady advance in the efficiency and ability in the private yards, in which all these ships are being built, as the workmen in the yards are, after some years of experience in this work, becoming highly trained in their duties, and it has become possible to complete the latest ships, even with their considerably increased tonnage, in about three years from the date of their commencement. In spite, however, of the increased rapidity in the time of construction, some years must yet elapse before the proposed double squadrons of battle-ships can be completed.

Dockyard Notes.—The work of repairing and modernising the four battle-ships of the "Brandenburg" class, which is being carried out at Wilhelmshaven is so far advanced that the "Wörth" and "Weissenburg" will be ready for commissioning this autumn, when they will be attached

to the 2nd Squadron of the Active Fleet. Among other improvements which have been carried out have been the substitution of steel, as far as possible, for wood; the removal of the torpedo-tubes to positions below the water-line from the stations above water, where they were originally fitted, which has been a work of some difficulty; a complete overhaul of the engines and boilers, and the strengthening of the secondary battery amidships by an additional two 4·7-inch Q.F. guns. The other two ships of the group, the "Kurfürst," "Friedrich Wilhelm," and the "Brandenburg," will not be completed until next year.

Considerable progress is being made with the new docks now under construction at Wilhelmshaven—three in number. They are of the same dimensions as the new ones at Kiel, viz., 570 feet long, with a depth of 35 feet on the sills. A second fitting-out basin is also to be constructed, and a new entrance to the existing basin has been commenced, as the present entrance is too small for the needs of the new battle-ships. Some years, however, must elapse before the great works now in hand can possibly be completed.

A further advance towards the completion of the great mercantile harbour at Tsingtau has been made. The lower portion of the first jetty and the filling in of the ground behind are now completed, as well as the dredging out of the entrance to the channel and up to the jetty, while the connection between the jetty and the Shan-tung Railway is also finished. The breakwater for the protection of the harbour basin is also so far completed that the Government have felt themselves able to announce that the jetty can now be used. The quay, when completed, will be about 700 yards long; for 120 yards of this there will only be a depth of water alongside of 17 feet; but for the rest of the quay there will be a depth of water of from 26 to 32 feet. Some 500 yards of the quay are now available, alongside which the largest ships can lie easily, and temporary storehouses for the housing of goods have been erected, while a space of 10,000 square yards has been set apart for the erection of permanent godowns.

Oil Fuel.—The use of oil fuel is being extended in the Navy. Several of the torpedo-boats in addition to some of the larger ships are now fitted to consume oil. The Imperial yacht "Hohenzollern" is so fitted, while all the new battle-ships of the "Braunschweig" type carry 200 tons of oil in their double-bottoms. Large tanks have been erected in the dockyards at Kiel and Wilhelmshaven, and at the coaling stations at Holtenau and Brunsbüttel for the storage of oil, while an oil transport-ship has recently been delivered at the Imperial dockyard at Kiel specially built and fitted for replenishing the oil supplies in ships at sea or in harbour. The vessel is divided into twelve large water-tight compartments, besides being built with a double-bottom: six of these compartments are used for the storage of oil, while in the after part of the ship is a powerful pumping equipment for supplying the oil to other ships, and a steam heating apparatus for maintaining it at a proper temperature. Another similar vessel is to be constructed, and it is believed that much time and trouble will be saved to the ships of the squadrons to which these transports are attached, as it is much easier for ships to replenish their supply of oil from them than it is to coal at sea, which latter operation can only be carried out under favourable conditions of wind and weather.—*Neue Preussische Kreuz-Zeitung.*

UNITED STATES.—*Naval Gunnery Precautions.*—Recommendations by the United States Ordnance Bureau.—The United States Navy Department, with a view to prevent the recurrence of such an accident as that which recently happened with the after-turret gun of the "Missouri," owing to the ignition of the powder charge whilst the gun was being loaded, addressed an inquiry to the Bureau of Ordnance on the following points :—

a. What additional regulations, if any should be issued governing the methods of handling ammunition on board ship; and what additional precautions should be observed in the service of guns to insure safety from flaming gases on opening the breech?

b. What steps should be taken to modify the turret arrangement of ships now building, and what alterations of the turrets of ships completed should be made to guard against the extension of accidental fire in the turret to the handling-room and adjacent magazines?

.. What mechanical means should be employed to clear the bore of residual gases; and what changes, if any, should be made in the form of the cartridge bag or its material, or in the form of powder grain, or the character of the powder, to prevent or reduce to a minimum the danger from imperfectly consumed gases remaining in the guns after discharge?

The Ordnance Bureau has replied as follows :—

a. Additional regulations governing the methods of handling ammunition and service of guns on board ship are deemed by the bureau to be necessary. To meet this necessity, the bureau prepared a special order, which was submitted to the department 31st May, 1904, with the recommendation that it be approved and issued for the guidance of the Service.

b. The board on construction has had under consideration for some time the question of closing the openings between the turret and the handling-room in the turret designs of all vessels, and the bureau of construction and repair has under construction a model turret designed to effect this result. This model turret will soon be completed, and will be given most serious attention by this bureau, which recognises the great importance of the principal feature of its design. The Bethlehem Steel Company has constructed, and is having installed at the Louisiana Purchase Exposition a model turret arrangement designed to accomplish the isolation of the turret from the handling-room, and it is the bureau's intention when the installation is completed, to have this arrangement thoroughly inspected, and a test of its operation witnessed by the bureau's representatives.

The application to the turrets of ships now building of automatic doors to close the opening between the turret and the handling-room is receiving the present consideration of the bureau of construction and repair. A design of automatic doors for opening and closing the passage for the 12-inch ammunition car in the 8-inch handling-room platform of the double turrets of the "Virginia" and class, has already been completed, and one such apparatus is now being constructed

for test. In regard to ships in commission, each type of turret must, of necessity, receive consideration by the bureau of construction and repair, with the view of the development of a design of automatic doors to best suit the necessities of each individual case, and this bureau will co-operate to the fullest extent with the bureau of construction and repair in this work.

It is recommended that the board on construction pass upon the above plans for preventing the extension of accidental fire to the handling-room and adjacent magazines before any of them are finally adopted.

c. Mechanical devices of three different types have been manufactured, designed to clear the bore of residual gases of burned bits of cartridge bags by means of compressed air, water, or steam. Two types of this apparatus are attached to the guns on board the U.S.S. "Illinois" and "Massachusetts" and will be tried at the first opportunity. Another type has been fitted to a gun at the Washington Navy Yard, and will be given a test at the naval proving ground. Shop tests indicate that all these appliances are effective, and the bureau has no doubt that one will be found to fully meet all requirements.

The bureau believes that, even should a powder be invented of which the products of combustion were inert and harmless, there would still remain a possible danger from smouldering residue of burning cartridge bag or cartridge bag tape.

In looking further for a means to prevent possible danger from unburned cartridge bag in the powder chamber, the bureau has purchased a quantity of nitrated cotton fabric manufactured abroad, and reported to have been adopted for use by the German Government. Sample cartridge bags made from this material will be used for experimental firing, and the question of adopting some such fabric for cartridge bags will be determined by the results. Experimental cartridge bags of various forms are being made at the naval gun factory, with a view to reducing the quantity of material used, and aiding the passage of flames to the ignition charge. These will be experimented with, and the best form of bags selected for adoption and issue to service.

The bureau is, at present, having manufactured, both by private manufacturers and at the Government powder factory at Indian Head, experimental forms of powder grains, and some of these should be ready for test within the next two months. A delay of several months between the orders to manufacture and the readiness of the finished powder for test is necessary and is due to the length of time required for drying the experimental samples. The bureau is of the opinion that the form of granulation will not have any influence upon the character of combustion of the powder in so far as the chemical nature of the products of the combustion are concerned, and these sample powders of different forms of grain will be chiefly useful in determining the form of grain giving the best ballistic results.

The expert Government chemists and those of the private factories which are now manufacturing powder for the Government, have for years been employed in researches connected with the manufacture and study of the nature of smokeless powder, and are fully alive to the danger resulting from imperfectly consumed and highly heated gases in the chambers of guns, and their efforts will be especially directed to overcome this danger, if possible. The bureau has further determined that the facilities of the powder factory at the naval torpedo station, Newport, R.I., which are not adequate for the manufacture of large quantities of smokeless powder, shall be turned to the province of experiment, where, with more deliberation, investigation into the nature and properties of existing powder, or possible modification of its constituents may be profitably carried out.

Designs for 13,000-Ton Battle-ships.—The following three reports from the Board of Construction on the subject of the designs for the two 13,000-ton battle-ships "Idaho" and "Mississippi," which were laid down in the early part of the present year, may be of interest:—The first of these is the report of the majority of the Board, the Chiefs of the Bureaus of Ordnance, Admiral O'Neill; of Construction and Repair, Admiral Bowles; and the Bureau of Steam Engineering, Admiral Rae. This report, which has been approved by the Secretary of the Navy, follows:—

"9th October, 1903.

SIR,

1. In compliance with the Department's endorsement No. 8557-37 of 26th September, 1903, transmitting letters from nine officers of the Navy whose views were invited by the Department with respect to the design of the two 13-000-ton battle-ships authorised by the Act of 3rd March, 1903, the Board has the honour to inform the Department that it has carefully considered the letters referred to, which are returned herewith.

2. The Board does not consider it necessary to comment upon the individual opinions expressed in the accompanying letters.

3. While it is interesting to obtain the views of the Service upon the desirable qualities for naval vessels, and while it is always the earnest endeavour of this Board to meet these views so far as practicable in the designs which are prepared, it is nevertheless difficult to obtain individual opinions on specific points of design which will lead to a satisfactory determination of any vexed question. The officers consulted necessarily cannot have the matter set before them in all its bearings, with full data, plans and the evidence necessary to arrive at a satisfactory conclusion, and the exact question at issue is liable to become secondary to particular opinions of the writer on what battle-ships in general should be.

4. The Act of Congress of 3rd March, 1901, required the Department to report to Congress a full description of the designs of battle-ships and armoured cruisers which it would recommend for adoption, and this Board submitted a report on that matter dated 26th November, 1901, which was adopted by the Department and forwarded to Congress, resulting in the authorisation of the two 16,000-ton battle-ships "Connecticut" and "Louisiana," of 18 knots speed, and the two 14,500-ton armoured cruisers "Tennessee" and "Washington," of 22 knots speed, on 1st July, 1902, and which are now under construction. In the same Act authorising

the two 13,000-ton battle-ships, now under consideration, Congress appropriated for three first-class battle-ships of 16,000-tons trial displacement, which have already been contracted for, on designs almost the same as their predecessors, also of 18 knots' trial speed, and named the "Vermont," "Kansas," and "Minnesota."

5. The Board is still strongly and unanimously of the opinion that an actually first-class battle-ship should have a speed of 18 knots, and in the recommendations heretofore made or herein expressed does not intend to convey that the design of the 13,000-ton battle-ships represents its opinion of what first-class battle-ships should be, nor what the United States Navy should have.

6. The problem has, however, presented itself of preparing a design to meet the conditions of the law as expressed in the Act of Congress of 3rd March, 1903, in the following words :—

'. . . . two first-class battle-ships, carrying the heaviest armour and most powerful ordnance for vessels of their class, upon a trial displacement of not more than thirteen thousand tons, and to have the highest practicable speed and great radius of action, and to cost, exclusive of armour and armament, not exceeding three million five hundred thousand dollars each.'

7. The language is precisely the same as is employed in the preceding lines of the same act in appropriating for the "Vermont" class, except as to the displacement and the cost.

8. Therefore, with embarrassment of an inadequate displacement and limit of cost, it has been necessary to arrive at a conscientious expression of opinion on the part of the Board as to what features would produce the maximum battle power on a limit of 13,000 tons displacement.

9. The Board had under consideration sketch designs of various types combining the different important features of armament, armour, speed and coal endurance in varying degrees, and has carefully weighed designs of vessels for 17 knots, 18 knots, and 20 knots trial speed.

10. Those of the highest speed were necessarily rejected as being armoured cruisers in effect, and therefore not authorised by the law.

11. The question, therefore, became a choice between a reproduction of the new "Maine," which is practically of 13,000-tons trial displacement and 18 knots' trial speed, with such changes in armour and armament as the same amount of weight somewhat differently distributed would, in those respects, bring the design somewhat more up-to-date, and a design at 17 knots speed with much greater battery power, better armour protection, and superior coal endurance.

12. The investigations of the Board have shown that the additional knot speed is obtained only by the addition of 60 per cent. to the engine power of the 17-knot vessel, and a corresponding increase of machinery and boilers, which increase actually amounts to 570 tons. With this weight available for armour and armament it is possible to give the 17-knot vessel a weight of battery and ammunition 27 per cent. in excess of that given to the 18-knot vessel, and to vastly improve the protection and efficiency of the battery by mounting more and heavier guns in turrets; thus the 18-knot vessel would have four 12-inch guns in two turrets, eight 8-inch guns in four turrets, and ten 7-inch guns in the central battery.

13. Considering that speed is an element of power which does not always remain invariable with a ship, but is dependent upon the vessel's condition and age, and that the elements of battery and defensive armour are fixed and definite in the battle power they represent, the Board concluded, with due regard to the fact that the Navy already has nine battle-

ships of 17 knots speed and less, that the price to be paid in fighting power for one knot speed was too great, and therefore decided to recommend the 17-knot design for the vessels authorised by this act. To this view the Board respectfully adheres.

14. In view of the fact that lower speed renders vessels less able to avoid the attack of the torpedo, the Board recommends that the design of the 13,000-ton battle-ships, as outlined in its report of 10th June, 1903, and approved by the Department on the same date, be amended by the addition of two broadside submerged torpedo-tubes, the reduction in the battery of two 7-inch guns, and the increase of the main armour belt to a uniform thickness of nine inches instead of tapering from nine to seven inches.

Respectfully,

CHIEF OF BUREAU OF ORDNANCE, President of Board.
CHIEF OF BUREAU OF EQUIPMENT, Member.
CHIEF CONSTRUCTOR, U.S.N.
CHIEF OF BUREAU OF CONSTRUCTION AND REPAIR, Member.
CHIEF OF BUREAU OF STEAM ENGINEERING, Member.

The Secretary of the Navy."

Admiral Bradford on the 13,000-ton Ships.—Following is the text of Admiral Bradford's minority report on the design of the 13,000-ton battle-ships :—

"In accordance with Article 1761, paragraph 2, Navy Regulations, I have the honour to state herewith my reasons for dissenting from the report of the majority of the Board on Construction.

Referring to paragraphs 2 and 3 of the above mentioned report :—I consider the individual opinions of the officers to whom the Department referred the subject matter of designs for 13,000-ton battle-ships very important. Most of them are logical and contain much information; they are from officers of established reputations. The reports from Captains Converse and Manney are especially valuable, owing to their recent experience in command of battle-ships; the reports from Lieutenant Commanders Whittlesey and Sims are also exceedingly valuable. The discussion of the latter as to the relative height of gun ports above the deep load line of ships is very important. Of the nine opinions submitted by officers, six favour a speed of 18 or more knots.

I concur in paragraphs 4, 5, 6, 7, 8, 9 and 10, of the report of the majority.

Referring to paragraphs 11 and 12: I invite attention to the fact that the design first submitted for the "Idaho" and "Mississippi" was for 16½ knots; also that this speed has now been increased, on paper, one-half knot without change in the form of hull or increase of power, although it is stated that to increase it one knot more involves an additional weight of 570 tons. With reference to designing a ship to comply with the wording of the appropriation act for the construction of the "Maine" class is practically the same as for the 13,000-ton class. The Chief Constructor stated in the board room that, in his opinion, the appropriations for the "Idaho" and "Mississippi" were not sufficient to permit their construction by the majority. He admitted that the "Maine" class were cheaper ships. Owing to the fact that three ships of the "Maine" class have been constructed by three different shipbuilding firms, there is no doubt that duplicates can be built much cheaper than a new design.

Referring to paragraph 13 of the majority report, I do not concur in the principle herein enunciated. To whatever vicissitudes ships in

service are subjected, there is no reason to suppose that a reduction in speed, for whatever cause, will not be relatively the same for all ships. Therefore, to intimate that an 18-knot ship may not be able to go any faster than a 16½-knot ship is wrong in principle.

Referring to paragraph 14 of the majority report, I concur in the introduction of two submerged torpedo-tubes in the two 13,000-ton battle-ships, because I am in favour of introducing torpedoes in all large ships, behind armour and under water, and have consistently urged their installation in the past. The inference, however, that they are necessary in 18-knot or faster ships is not concurred in. England is building very powerful 19-knot battle-ships and our 18-knot ships, if pitted against them, would require torpedoes, even on the principle enunciated in paragraph 14. As a matter of fact, the locomotive torpedo has recently become such an accurate long-range weapon that its presence is important in all ships of large size, whatever their speed.

There are two important qualities of the design now recommended by the majority of the Board, which I believe should receive serious consideration: (1) The relation of the speed of this design to the speed of ships building, and (2) capacity for sea fighting.

If the speed of the "Idaho" and "Mississippi" corresponds to that of the old battle-ships, then they must be relegated for service to the old battle-ship class, and the first line of defence, composed of battle-ships of the latest and most powerful type with speed of 18 knots, is not strengthened. There is no doubt of the importance of increasing this first line of defence as much and as soon as possible.

Should the slow "Idaho" class be added to the "Maine," "Virginia" and "Connecticut" classes, then the speed of the fleet would be reduced 1½ to 2 knots. Even if this sacrifice should be made the "Idaho" class would still be useless in a moderate seaway, owing to low freeboard.

A full discussion of this question will be found in Lieutenant Commander Sims's report. Reference is further made to a report of the commanding officer of the "Kearsarge," which ship has higher gun positions than the "Idaho." It is stated in this report that during 61 days' summer cruising the turret guns could not be used, and that at least for one-third of this time the broadside guns could not be used, both on account of the condition of the sea. The "Maine" class has not only 18 knots speed, but higher gun positions than any of the battle-ships thus far designed.

I desire to add to my reasons for non-concurring to this report of the majority the statements heretofore made in opposition to the design under discussion.

Very respectfully,
R. B. Bradford."

Rejoinder of the Board to the Minority Report.

The opinions of Admiral Bradford, Chief of the Bureau of Equipment, as shown in his minority report, are sufficiently shown in the rejoinder of the majority of the Board, which follows. They have also been set forth at length in previous publications:—

"1. The majority desires to point out that the statements made by the dissenting member, in paragraph 3, that "the design first submitted for the 'Idaho' and 'Mississippi' was 16·5 knots speed; also that this speed has now been increased, on paper, one-half knot without change in the form of hull or increase of power, although it is stated that to increase it one knot more involves an additional weight of 570 tons," is

absolutely unjustified by the facts in the case. The Chief Constructor, in introducing on 27th May five designs for the consideration of the Board, accompanied them with a written memorandum, which stated in regard to the No. 1 scheme, since adopted by the Board, that "the speed will be reduced from 18 knots to 16·5 or possibly 17 knots, depending upon obtaining a more efficient model than the preliminary one tested for the purpose of this sketch design." Subsequent to that time, a great number of models have been made and tested, and the one finally adopted provides for a speed of 17 knots for the power originally specified. The Board has been informed of these facts by the Chief Constructor.

2. The dissenting member, in paragraph 8, states "the 'Idaho' class would still be useless in a moderate seaway, owing to low freeboard." The Board considers this statement as entirely unjustified by the facts or by any experience whatever, and calls attention to the fact that the freeboard of the "Idaho" forward is the same as that of the "Virginia" class, and 6 inches less than that of the "Maine." The forward 12-inch guns and the eight 8-inch guns in turrets are carried at a height of 26 feet above the water-line, 6 inches higher than the corresponding guns on the "Virginia," and 6 inches lower than the forward 12-inch guns upon the "Maine." The after 12-inch guns in turrets are carried 17 feet 6 inches above the water-line, 2 feet less than those on the "Maine." The 7-inch guns of the main deck battery are carried 14 feet 9 inches above the water-line, the same as the "Virginia."

3. The majority of the Board is of the opinion that in a seaway the "Idaho" will have superior fighting ability to the "Maine."

4. The dissenting member states, in paragraph 9, that "the 'Maine' class has not only 18 knots speed, but higher gun positions than any of the battle-ships thus far designed." The majority of the Board desires to state that the "Maine," as originally designed, carried her various guns about 6 inches higher than corresponding guns in other battle-ships, but in actual construction the "Maine" has proved to be 6 inches over the original designed draught, and has thereby lost this slight advantage.

5. The chief point at issue between the Board and the dissenting member is the question of the maximum speed, on trial displacement of the 13,000-ton battle-ships under consideration. In its report herewith the Board has set forth its views concerning this matter, with the reasons therefor. As much stress is laid upon the importance of homogeneity of the vessels of a fleet, especially in the matter of speed, and while such an element is without doubt of great importance and much to be desired, it should be remembered that speed is the most fluctuating quality a vessel possesses, being largely a matter of condition, depending upon draught, trim, condition of the vessel's bottom, condition of her boilers, quality of coal, and the efficiency of the engine and fire-room forces. Therefore, in vessels of exactly the same class, there will always be a very appreciable difference in speed, depending upon their respective condition.

6. It is argued by the dissenting member that "There is no reason to suppose that a reduction in speed, from whatever cause, will not be relatively the same for all ships," but the answer to this is, that the causes which operate to reduce the speed of vessels are not common to all vessels at the same time. The case of the "Oregon" and "Indiana" during the Spanish-American war illustrates in a forcible manner what may happen to vessels of similar type, built at the same time; the "Oregon" being several knots faster than the "Indiana" at the battle off Santiago de Cuba, due to the difference in condition of the boilers and bottoms of the respective vessels.

7. These arguments are not intended to show that high speed is not desirable,, but are intended to show that homogeneity of speed, at the higher rates of speed, is a condition exceedingly difficult, if not impracticable, of fulfilment. Armour and armament remain constant, and homogeneity with respect to them will not change, whereas homogeneity with respect to speed can only be expected at moderate rates of speed, never at the maximum speed for which the vessels were designed.

8. Aside from the question of speed, however, the Board differs from the dissenting member as to the calibre of the guns forming the intermediate battery and the method of mounting them. The Board recommends a mixed intermediate battery of eight 8-inch and eight 7-inch, the 8-inch being mounted in pairs in four turrets, and the 7-inch in broadside, whereas the dissenting member recommends fourteen 7-inch guns in broadside. In this connection, it is of interest to note, and quite pertinent to the present question, that when the designs of the five battle-ships of the "Virginia" class were under consideration a question arose, on which the Board divided, as to the use of superposed turrets. The matter was referred to a Special Board of thirteen officers, among whom were the five members then forming the Board of Construction, the dissenting member in the present case being a member of that Board. The question naturally involved the relative value of 6, 7, and 8-inch guns for the intermediate battery. The present dissenting member insisted that the 8-inch gun must be retained, and used every argument at his command in favour of its retention, and in the plans of those ships, as finally adopted, each carried eight 8-inch guns as part of her intermediate battery. More recently the case came up again, when the Board of Construction was called upon to prepare plans and specifications for sea-going battle-ships to be submitted to Congress in December, 1901, which resulted in the 16,000-ton vessels of the "Louisiana" class. In this case the Board recommended a design having twenty 7-inch guns for the intermediate battery, while the minority favoured a vessel carrying twelve 8-inch guns in six turrets, two of which were to be superposed on the 12-inch turrets, and twelve 6-inch guns in casemates. The present dissenting member on this occasion used every argument at his command on that occasion to discredit the 7-inch intermediate battery, which he now favours for the vessels of the "Idaho" class, insisting that 8-inch guns should be retained. The following language is quoted from his statement of 19th July, 1901:—"It became evident, however, that the Board strongly favoured the 8-inch gun and would not submit to a reduction in calibre." Again:—"Even should the 7-inch gun fulfil the expectations of the Bureau of Ordnance, it cannot replace both the 8-inch and the 6-inch guns. Its shell will lack the penetrative and destructive fire of the 8-inch shell, and it will fail to produce the smothering effect of the very rapid fire of the 6-inch gun." Again:—"For certain reasons in connection with the present quality and method of distribution of armour, it is conceded by all to be very desirable to restore 8-inch guns to battle-ships." And still again:—"What the minority does claim is that the latest type of 8-inch gun, with its improved mount, sights, turrets, turret-moving mechanism, etc., should be used in the new battle-ships, in preference to a newly-designed and untried 7-inch gun of less power." In fact the present dissenting member utterly repudiated the 7-inch gun for the intermediate battery which he now recommends for the "Idaho."

9. In connection with the controversy as to the batteries of the battle-ships of the "Louisiana" class, the Department invited comments

and criticisms from some eighty or more officers of the Navy. While these replies indicated that about one-half the officers interrogated were in favour of and one-half were opposed to superposed turrets, there was a consensus of opinion in favour of retaining 8-inch guns, and the Board of Construction finally agreed unanimously as to the batteries of the battle-ships of the "Louisiana" class, five of which are now building, and on 26th November, 1901, addressed a letter to the Department, concerning the characteristics of battle-ships containing the following language:—"The question as to what should be the calibre of the guns of the intermediate battery of battle-ships is one with regard to which there is considerable difference of opinion, some good authorities preferring a uniform battery of 6-inch R.F. guns, and others a mixed battery of 6 and 8-inch, while others prefer 8-inch only."

"The Board having given careful consideration to this important question in all its aspects, and having before it the opinion of upwards of eighty naval officers of prominence, on this subject, it is of the opinion that a combination of 8-inch and of 7-inch rapid-firing guns is best suited for the intermediate battery of the battle-ships under consideration. The use of heavier armour of improved quality over a large area of the latest types of foreign vessels renders the use of guns of great range and energy imperative. Hence the 8-inch gun, which is essentially an armour-piercing gun at long range against all but the heaviest armour, has been selected, on account of its great efficiency, as part of the intermediate battery, supplemented by the 7-inch gun, which, while embodying all the features of a rapid-firing gun, has the energy to perforate 7 inches of the best quality of armour, when striking normally, at a distance of 3,000 yards."

10. The present dissenting member signed this report, and the Board in considering the armament of the "Idaho" class has been largely influenced by the same principles which governed the Board of Construction in deciding upon the armament for the "Louisiana" class. The retention of the 8-inch gun seems to be a necessity, in view of the fact that guns of 9·2 inches in calibre are now designated as part of the intermediate battery of certain foreign battle-ships, and that heavier armour for the protection of gun positions is now generally adopted.

11. These comments with regard to armament are for the purpose of calling the attention of the Department to the fact that the difference between the Board and the dissenting member is not confined to a question of speed alone.

Respectfully,

CHIEF OF BUREAU OF ORDNANCE, President of Board.
CHIEF CONSTRUCTOR, U.S.N.
CHIEF OF BUREAU OF CONSTRUCTION AND REPAIR, Member.
ENGINEER-IN-CHIEF, U.S.N.
CHIEF OF BUREAU OF STEAM ENGINEERING, Member."

—*U.S Army and Navy Journal* and *U.S. Naval and Military Record.*

MILITARY NOTES.

PRINCIPAL APPOINTMENTS AND PROMOTIONS FOR JUNE, 1904.

The King has been graciously pleased to become Honorary Colonel of the Royal Malta Artillery.

Generals—General P. S. Lord Methuen, G.C.B., K.C.V.O., C.M.G., is temporarily appointed Commander of the IVth Army Corps.

Major-Generals.—Major-General E. S. Brook, C.B., to be a Major-General on the Staff to command the troops in Cape Colony District.

Colonels.—Lieut.-Colonel and Brevet Colonel E. W. Herbert, C.B., from h.p., to be Colonel to command the Rifle Depôt. Colonel (temporary Brigadier-General) Sir J. G. Maxwell, K.C.B., C.V.O., C.M.G., D.S.O., from Chief Staff Officer IIIrd Army Corps, to be Staff Officer to the Inspector-General to the Forces, retaining the rank of Brigadier-General whilst so employed. Lieut.-Colonel and Brevet Colonel the Hon. J. H. G. Byng, M.V.O., from 10th (Prince of Wales's Own Royal) Hussars, to be Commandant, Cavalry School. Lieut.-Colonel and Brevet Colonel A. G. Churchill, from h.p., to be A.A.G. 6th Division, IInd Army Corps, and is granted the substantive rank of Colonel in the Army.

FRANCE.—*War Budget for 1905.*—The scheme of the Budget for 1905, issued by the War Department, is as follows :—

	Francs.	Francs.
1st Section (Home troops)	623,326,072	
2nd „ (Colonial troops)	28,636,694	679,329,916
3rd „ (Extraordinary expenditure)	27,367,150	

The budget for 1904 amounted to :—

1st Section (Home troops)	619,031,162	
2nd „ (Colonial troops)	28,575,754	676,329,916
3rd „ (Extraordinary expenditure)	28,723,000	

The scheme for 1905 exceeds that of 1904 by 3,000,000
which is accounted for as follows :—

INCREASE.

1st Section (Home troops)	4,294,910
2nd „ (Colonial troops)	60,940
Total increase...	4,355,850

DECREASE.

	Francs.
3rd Section (Extraordinary expenditure)	1,355,850
Increase remaining	3,000,000

1ST SECTION (Home Troops).

General Observations.—The effective which has served as a basis for the budgetary previsions for 1905 show the following differences when compared with that for 1904 :—

—	Regular Army (including Sahara troops.)		Gendarmerie.		Horses.
	Officers.	Rank and File.	Officers.	Rank and File.	
1904	28,990	520,830	683	24,034	142,323
1905	28,927	520,805	679	24,047	141,723
Difference for 1905 increase ...	—	—	—	13	—
Difference for 1905 decrease ...	63	25	4	—	600
	-88		-9		-600

These differences are thus accounted for :—

Regular Army.—The decrease of 63 officers is caused by the decrease in the number of cadet officers at the School of Application for Artillery and Engineers; from the disbanding of the companies of the 4th battalions of regiments of the Infantry of the Line; by the substitution of 13 officers on the active list for recruiting in the place of 13 retired officers. The reduction in the effectives of the rank and file is the result of various changes in the effectives of different departments, schools, etc. The effectives in the preceding table of comparison are the net effectives after a deduction of 8 per cent. has been made for men on furlough, leave, in hospital, etc.

Gendarmerie.—The decrease of 4 officers of Gendarmerie is the result of the administration of that corps by legions. The increase of 13 men in the effective of the Gendarmerie is caused by the formation of 2 foot squads (10 men) and 1 mounted squad (5 men), account being taken of the changes of the squads giving a saving of 2 men.

Horses.—The total strength shows a falling off of 600 horses from that of 1904. The decrease is principally caused by the striking out of the effectives the 520 young horses kept at remount depôts for the artillery. These young horses have hitherto figured in the effectives, but in consequence of a reorganisation in the administration of the Remount Department, the War Department has transferred them to another list.

2ND SECTION (Colonial Troops).

Effectives.—The following table shows the difference in the effectives provided for in the Budget of 1905 from those of 1904 :—

Branches of Service.	Effective of 1905.		Effective of 1904.		Differences for 1905.			
					Increase.		Decrease.	
	Officers.	Rank and File.	Officers.	Rank and File.	Officers.	Rank and File.	Officers.	Rank and File.
Staffs and Reserve cadre ...	186	44	170	51	16	—	—	7
Paymasters	46	—	46	—	—	—	—	—
Assistant Paymasters ...	23	—	13	—	10	—	—	—
Surgeons and Doctors ...	131	—	107	—	24	—	—	—
Assistant „ „ ...	10	—	4	—	6	—	—	—
Colonial Infantry	1,176	20,890	1,176	20,867	—	23	—	—
„ Artillery	281	4,790	275	4,863	6	—	—	73
Totals	1,853	25,724	1,791	25,781	62	23	—	80
	27,577		27,572		+ 85		- 80	
		+5				+5		
Horses of Officers and Men	1,588		1,650				62	

3rd Section (Extraordinary Expenditure).

The credits demanded for 1905—viz., 27,367,150 francs—compared with those granted on the 30th December, 1903—viz., 28,723,000 francs—show a decrease of 1,355,850 francs, the causes of which are as follows :—

	Francs.
Decrease—Completion of Bizerta defences	1,238,000
Diminution of artillery ammunition	1,320,000
Total	2,558,000
Increase—Artillery *Matériel*	800,000
Sights for Small Arms	250,000
Matériel for Cyclist units and sundries	152,150
Total	1,202,150
Decrease remaining of	1,355,850

—*Précis of Budget Général de l'Exercice, 1905.*

Italy.—*Italian Cavalry.*—The following light was thrown on the position of the Italian cavalry at the sitting of the Chamber of Deputies on the 25th May last :—

With regard to the employment of artillery and cavalry, the geographical and topographical conditions of Italy present the following picture :—

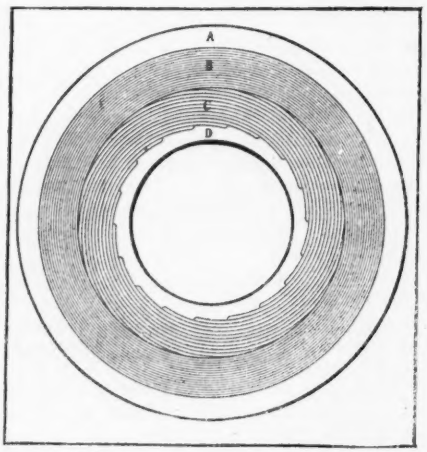
The proportion of mountainous to open country is about two-thirds to one-third, and in addition to this the open country is for the most part intersected by canals. Throughout the ranges of the Alps, as well as in the zone of the lesser hills which slope down towards the open country of the Po, the movements and employment of large masses of cavalry and artillery find their limit. The same limitations occur, but not to such an extent, in the more open country of Potales, Venice, and Friuli. When one considers the frontiers against which warlike operations would naturally be directed, it will be seen that on the western frontier, towards

France, and on the northern frontier, towards Switzerland, cavalry and artillery can certainly act in conjunction, but only in limited numbers, and in small bodies, whilst on the eastern frontier, towards Austria, it will be found that these two branches of the Service can be maintained at full strength, and can act in larger masses. The French sphere of action closely resembles that of the Italian. Towards the south-east (Italy), operations with regard to cavalry and artillery meet with very similar difficulties as those of their opponents. But on the French frontiers towards Germany the country is for the most part undulating, open, and intersected, and makes it possible for these two branches of the Service to act in conjunction with infantry, and in larger bodies. In the Swiss sphere of action, on account of the mountainous and thickly-wooded nature of the country, an even more limited employment of cavalry and artillery is possible than in the neighbouring Italian State. The Austrian territory exhibits similar conditions as the Italian; the vast Hungarian plains, however, which are uniform and treeless, are favourable to all movements of the mounted arms. The German sphere, with few exceptions, is undulating and open, and favours the harmonious working of all three branches of the Service, as well as the employment of larger masses of cavalry and artillery. Although it is impossible to compare mathematically the topographical and geographical conditions of these five States, it is nevertheless possible to realise that those of Italy and Austria are similar, and are both far more favourable than those of Switzerland; they are, however, as regards the employment of the above-named branches of the Service, less favourable than those of Germany and France. Whilst, therefore, the relations between cavalry, artillery, and infantry in Italy are altogether more favourable than in Switzerland, and as favourable as those in Austria, they are less favourable than those in France, and still less so than those in Germany. As regards artillery, Italy has relatively fewer than Switzerland; her equality, in that respect, with France is only apparent, as the French guns are far more easily worked than the Italian. The topographical and geographical conditions for the German and Austrian artillery are much the same as for the Italian. The proportion of cavalry amounts in France to 9·45 per cent., in Switzerland to 3·86 per cent., in Austria-Hungary to 8·05 per cent., in Germany to 10·52 per cent., and in Italy to 5·04 per cent. Italy is therefore considerably behind France, Austria, and Germany, and only slightly in advance of Switzerland in that respect. It is, therefore, far more necessary for Italy to increase her cavalry than her artillery. These considerations increase in value, if one considers those Powers with whom the Italian Army may come into collision, on either side of the Alps—viz.: in those districts where artillery and cavalry can manœuvre successfully and in masses.—*Die Vedette.*

United States.—*High-Velocity 6-inch Wire-wound Gun for the United States Army.*—The Board of Ordnance and Fortifications of the United States Army recently made an allotment of $41,000 for the construction of a 6-inch Brown wire-wound gun which, if it fulfils the requirements of the specifications on which it is built, will certainly be the most powerful piece of its weight and size in existence. The gun will shortly be tested at Sandy Hook proving ground, and fire 250 rounds, with gradually increasing powder pressures, the last five rounds being fired under from 45,000 to 50,000 pounds maximum pressure in the powder chamber. The estimated service velocity of the gun is 3,541 feet per second, under a maximum

powder pressure of 42,823 pounds. The full significance of these figures will be realised if we compare them with the ballistics of the 6-inch 50-calibre navy gun, which is designed for a muzzle velocity of 2,900 feet per second when firing a 100-pound projectile. On 8th February of the present year the Bureau of Ordnance, in consequence of recent failures of some navy guns, decided to reduce the service velocities, and an order was sent out that the 6-inch 50-calibre navy gun was to have a service velocity of only 2,700 feet per second, which is 800 feet per second less than the service velocity designed for the new wire-wound gun under construction. As the striking energy of the shell varies as the square of the velocity, it will be seen at once how very much more efficient the new piece will be than the latest type of Navy gun.

If a person who was quite unacquainted with modern gun construction were to watch the tedious and costly process of building up a modern high-power gun, he would naturally ask why it is not forged out of one solid piece. The gunmaker, in explaining to the inquiring layman why guns must be built up piecemeal, would point out that, in forging masses



A.—Trunnion Jacket. B.—Wire. C.—Segmental Tube. D.—Line.

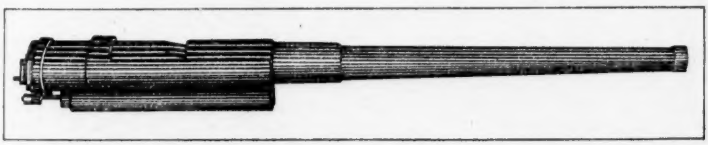
CROSS-SECTION THROUGH THE GUN AT THE POWDER CHAMBER.

of metal of the size that would be required, it would be impossible to detect any hidden defects, and that, steel being a highly elastic material, it is necessary that in the finished gun, if the whole mass of the gun is to be available in resisting the bursting effects of the powder, the metal be brought into a certain condition of initial strain. He would tell him that in the 12-inch gun, for instance, where there may be a foot or more of solid metal surrounding the bore, the pressure of the powder gases would stretch the metal at the bore of the gun to the rupture point, before the outer layers of metal were able to add their full resistance to that of the inner layers; that the bore of the gun would be cracked, and that the crack would eventually extend from bore to circumference. He would explain to him how Rodman, an Army officer, at the time of our civil war, very cleverly met the difficulty in cast-iron guns, by running a stream of cold water through the bore of the gun when it was being cast, chilling and con-

tracting the metal at the bore, with the result that as the body of the metal throughout the gun cooled from bore to circumference, it contracted and gripped the bore, throwing the latter into a state of compression, and placing the rest of the metal of the gun in a state of initial tension. The effect of this was that when the gun was fired the pressure of the powder gases was felt throughout the whole section of the gun from bore to circumference and every part of the metal did its share of duty.

He would then explain to him that as the manufacture of steel developed, the superiority of this metal to cast iron for gun manufacture became evident, and the Rodman principle of gun construction was applied by first making a steel tube containing the bore of the gun, and then shrinking on successive hoops of steel which, as they cooled, threw the inner tube into a state of compression, and were themselves left in a state of tension. He would explain to him further that in addition to the higher resisting qualities of steel over cast iron, the former metal, having the advantage of being built up in hoops which are forged on a mandrel, the metal of the hoops can be subjected to more thorough working and inspection, with a view to improving the quality of the steel and eliminating all defects. The gun manufacturer would then proceed to explain to our supposititious layman that the system of building up guns by winding steel wire upon an inner tube was a further step in the direction of securing

LONGITUDINAL SECTION, SHOWING THICKNESS OF WIRE WINDING.



New 50-calibre, 6-inch, Wire-wound Gun for the United States Army. Maximum powder pressure, 42,823 lbs.; muzzle velocity, 3,541 feet per second.

THE MOST POWERFUL GUN FOR ITS WEIGHT IN EXISTENCE.

thorough inspection of the steel, and of placing the finished gun under conditions of initial compression and tension which would be accurately known to the maker.

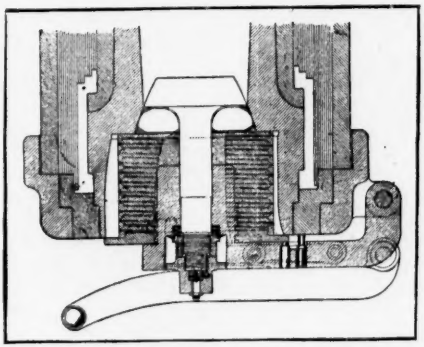
Although the wire-wound gun is but little known in the United States, the gun built by Captain Crozier, and the various Brown wire guns which have been built and tested by the Army, being the only guns of the wire type that have been built in the United States, the wire-wound system has been adopted by the English Navy, and is the standard type that is built by the two great gun-making firms of Armstrong and Vickers-Maxim in England. All the large guns of the latest English war-ships are wire guns, as are the weapons which are doing such good service in the Japanese Navy during the present war in the Far East. The system has, therefore, long ago passed beyond the experimental stage. The difference between the wire gun herewith described and the English and Japanese guns is that in the former the fundamental principles upon which wire

guns are constructed have been carried further along their logical lines of development, with ballistic results that are proportionately superior.

In the construction of the new 6-inch gun, the foundation consists of a forged steel lining tube with an elastic limit of 60,000 pounds, and an ultimate breaking strength of 105,000 pounds to the square inch. This tube extends for the full length of the gun, which is 26 feet 1 inch in length, and it is enlarged from a diameter of 6 inches in the bore to a diameter of 9 inches in the powder chamber, which has the length of 49·3 inches, and a cubical capacity of 3,120 cubic inches, which latter, it will be seen, is exceptionally large for a gun of its calibre. On this tube is assembled what is known as the segmental tube. It is formed of a series of sheets of rolled steel, 308 inches in length, 21¼ inches wide at the breech, and 4¼ inches wide at the muzzle of the gun, which are rolled into an involute shape and wrapped together to make up a solid tube. The sheets are first assembled on a stepped core, or former, and securely clamped. The core is then withdrawn and a stepped lining, of the section shown in our engraving, is forced into position within the segmental tube and the clamps are firmly screwed down, one at each 6 inches of the length of the tube, which is then centred in the lathe and turned to size. A new series of clamps is then put on, and the exterior of the segmental tube is turned down into stepped frustums of cones, each step being equal to the thickness of one wire, or one-seventh of an inch. There are seven of these steps over the bore of the gun, and four steps where the powder chamber commences, one of the latter steps being the depth of one wire, and three of the steps equal to the depth of two wires. Now comes the process of wire winding. One end of the wire is driven into a hole bored into the segmental tube at the first step from the powder chamber, and the wire, which is one-seventh of an inch square, is wound upon the gun under a tension of 2,500 pounds. The thickness of the winding varies from seven thicknesses, or one inch, at the muzzle, to 21 thicknesses, or 3 inches, over the powder chamber. A trunnion jacket, extending from the breech to beyond the trunnions, a distance of about 12 feet, is then shrunk on with sufficient tension merely to prevent its rotation upon the segmental tube. A sheet-steel tube is also placed over the chase of the gun for the purpose of giving it a finish and protecting the wire wrapping. It should be noted that no reliance is placed upon the trunnion jacket or the chase covering for the strength of the gun. By a study of the sectional view of the breech, it will be seen that the thrust of the breech-block is taken up jointly by the lining tube, the segmental tube, and the trunnion jacket, and a very even distribution of the longitudinal stress is thereby secured. The advantage of using a segmental built-up tube to carry the tension of the wiring is that the plates, being rolled down to a thickness of one-seventh of an inch, the danger of hidden flaws existing in the metal is practically eliminated; whereas when the solid tube is used, as in the built-up guns, there is sufficient thickness of metal for such flaws to exist without being detected. Moreover, in the segmental tube, should a flaw exist and a fracture occur in any one plate, it could merely extend through the thickness of one-seventh of an inch, and would not, as in the case of a solid tube, extend radially through the whole thickness of the tube.

In an investigation of the principles of the segmental tube wire gun by Professor Denton, of Stevens Institute of Technology, Hoboken, N.J., Mr. Denton estimated that there was no loss of longitudinal or tangential strength in the built-up tube, for the reason that the tension of the wire windings throughout the whole length of the tube will bind the segments

together "with sufficient pressure to cause the frictional adhesion between its curved lines of division to exceed the shearing forces which would be transmitted along these lines in a forged tube of the same thickness, when fired with powder developing the highest current pressures." He found, moreover, that "the metal of the segmental tube, by virtue of the magnitude of its frictional adhesion" (due to a tension of 125,000 pounds to the square inch in the wire winding), "is as available as a source of longitudinal strength and transverse stiffness as the same thickness of solid metal." Professor Denton further found that "the distribution of the wire windings secured a practically uniform compressive resistance in the lining tube throughout its length, and without exceeding about 90 per cent. of the elastic strength of the tightest wire. The lining of the tube was probably compressed, so that under 50,000 pounds per square inch of powder pressure it was not required to exert a tensile resistance." In other words, the principles of the wire gun had by this system developed to such a high point that when this gun is fired at Sandy Hook in the last



LONGITUDINAL SECTION THROUGH THE BREECH.

few rounds, with a maximum powder pressure of 50,000 pounds to the square inch, and a corresponding muzzle velocity of about 3,900 feet per second, the lining tube will still be under some of the initial compression which was given to it when the wire was wound on; which means that the wire with its high elastic limit of 150,000 pounds to the square inch, will be comfortably taking care of the enormous forces developed by the powder.

The unusually high velocities secured in this gun are due to the exceptionally large powder chamber. Owing to the abundant supply of gas given off by the burning powder, the pressure on the base of the shell is maintained at a high figure even to the moment that the shell leaves the muzzle, when the pressure is no less than 23,721 pounds to the square inch. In the earlier guns, the powder pressures fell rapidly towards the muzzle, and it is this high muzzle pressure that has caused the blowing off or bursting of the chase of several guns of the hooped type during the past few months. It can be seen at once that by increasing the number of windings of wire over the muzzle, this part of the gun may be made relatively just as strong and reliable as any other portion. — *Scientific American.*

WAR NOTES.

Shortly after the battle of Kin-Chau, a report was spread that the chief Russian Army, assembled about Liao-yang, had commenced a southward movement for the relief of Port Arthur. The truth of the matter was, however, that a large detachment, under the command of General Stackelberg, was despatched to the Liao-tung Peninsula in order to harass the Japanese there, and was apparently timed in conjunction with the raid of the Russian Fleet from Vladivostok. The strength of General Stackelberg's force is not exactly known. On the 2nd June it was reported from Niuchwang that he had marched with 14,000 troops on Wa-fang-kau, which is situated in the hills of Fou-chou, at the junction of the railway and the Fou-chou river. This Russian force, which was later estimated at 40,000 men, had a series of engagements with the Japanese troops from the beginning of the month. On the 14th and 15th June, however, a battle was fought in the vicinity of Wa-fang-kau or Telissu. The engagement was a severe one, and resulted in the complete defeat of the Russians. On the 14th the fighting was chiefly an artillery action, but on the 15th the Japanese undertook an enveloping movement near Telissu, and after severe fighting routed the Russians, who hastily retreated north, leaving over 1,800 dead on the field and some colours, 16 Q.F. guns, and 300 prisoners in the hands of the Japanese. The Japanese losses were about 1,000 men. Russian accounts estimate their own losses as between 6,000 and 7,000, whilst the Japanese place them at 10,000. The extreme difficulty of the country rendered a pursuit on the part of the Japanese impossible. In this battle the Japanese strength was estimated at about 70,000 men.

The latest accounts from the theatre of operations appear to indicate that the Russians are concentrated on a line between Niu-chwang and Liao-yang; the Japanese front seems to extend for about 60 miles along a line running from Kai-Ping to Ching-Chang. On the 26th-27th June the Japanese captured the Fen-shui Pass, manœuvring the Russians out of a strongly fortified position. The Motien and Ta Passes were also occupied by the Japanese. The country in which the two Armies are now coming into contact consists of a series of mountain ranges running parallel with the railway, alongside of which the Russians are falling back as the Japanese advance. The heavy rains have transformed the Manchurian roads into quagmires, and the passage of artillery is almost impossible.

Fighting has been constant in the vicinity of Port Arthur; several of the important neighbouring forts are reported to have been captured by the Japanese, including the Ta-ku-shan hill, which commands a considerable part of the inner harbour; the Japanese have, however, drawn such an impenetrable veil over their proceedings at Port Arthur that nothing definite is known. A Japanese official telegram states that General Oku reports that the Second Army began operations for occupying Kai-Ping on the 6th July, and that after four days' fighting the Russians were dislodged from their positions, and Kai-Ping and the neighbouring heights were finally occupied by the Japanese on the 10th July. Neither the numbers employed in the operations nor the casualties of either side are yet known.

There is a good deal of mystery overhanging the naval operations during the past month. As affecting the siege of Port Arthur, the Japanese by dint of hard work so far cleared Dalny harbour and Talienwan Bay, that by the 9th June, they were enabled to begin landing their siege guns and supplies at the first-named port, the piers of which do not appear to have been seriously damaged by the retreating Russians. On the 25th ult., a surprise awaited Admiral Togo in the appearance outside the harbour of Port Arthur of some 28 Russian vessels, including apparently the battle-ships "Retvisan," "Tsarevitch," "Poltava," "Peresviet," "Sebastopol," and "Pobieda," and several cruisers and torpedo-vessels. It was thus clear that the Russians must have succeeded in patching up their injured ships to a certain extent; the fleet did not, however, venture into the open, but anchored in the outer roadstead, where they were attacked during the night by the Japanese destroyers, which claim to have sunk one of the Russian battle-ships, and seriously damaged another, as one, either the "Sevastopol" or "Poltava," was observed being towed in the next morning in an evidently seriously damaged condition, while another of the large ships was observed to be on shore. It seems impossible for the present, to arrive at the truth as to what damage was done, as the accounts even by the refugees from Port Arthur, who have arrived at Chefoo, are most conflicting. Certain it is, that up to the present, the Russian ships, whether repaired or not, have not as yet ventured to face Togo's ships, and the presumption is, that when the repaired ships actually got under weigh, it was found that the repairs had not made them seaworthy. There has been since then some unimportant skirmishing with uncertain results, between the destroyers on both sides.

The Vladivostok Squadron, under the command of Vice-Admiral Bezobrazoff, consisting of the "Gromoboi," "Rossia," and "Rurik," with some destroyers, has made two raids, sinking two Japanese transports, and capturing some neutral steamers, but otherwise they have not effected anything of importance. They were lucky enough on each occasion to successfully evade Admiral Kamimura and his squadron. Vice-Admiral Skrydloff has taken up his Headquarters at Vladivostok. It is reported that the "Bogatyr," the fourth cruiser of the squadron, which went on shore in a fog at the entrance of Vladivostok in the beginning of May, has been refloated and taken into dock.

NAVAL AND MILITARY CALENDAR.

JUNE, 1904.

1st (W.) New colours were presented to the 3rd (Militia) Bn. North Staffordshire Regiment at Lichfield by the Countess of Dartmouth.

" " Skirmishes between the Japanese and Russian troops reported to have taken place near Si-ma-tsi, the Russians being driven back.

2nd (Th.) 4th King's Royal Rifle Corps left South Africa for England in the "Sicilia."

3rd (F.) 2nd Bn. West Yorkshire Regiment } Arrived in Ireland from South

" " 1st Bn. South Staffordshire " } Africa in the "Dunera."

6th (M.) H.M.S. "Mohawk" arrived at Plymouth from East Indies.

7th (T.) H.M.S. "Donegal" left Plymouth to join Cruiser Squadron.
" " 2nd Bn. the Queen's } Arrived in England from South
" " 2nd Bn. Gloucestershire Regiment } Africa in the "Soudan."
" " The enemy were repulsed with heavy loss in an attack on Kangma Thibet.
" " The Japanese troops occupied Si-ma-tsi.
8th (W.) " " " Sin-yen.
9th (Th.) H.M.S. "Minerva" commissioned at Devonport for Mediterranean.
" " 2nd Dragoons (Royal Scots Greys) } Arrived in England from South
" " 2nd Bn. South Wales Borderers } Africa in the "Plassy."
11th (Sat.) The Russians were entrapped near Kai-ping and sustained 800 casualties.
13th (M.) Headquarters and 5 companies 1st Bn. Hampshire Regiment arrived in England from Aden in the "Assaye."
14th (T.) Launch of first-class armoured cruiser "Duke of Edinburgh" at Pembroke.
15th (W.) The Japanese, after two days' fighting, defeated the Russians at Wa-fang-kau, or Telissu. The Russians left 1,854 dead on the field. The Japanese casualties were 217 killed and 946 wounded. The Japanese captured 16 Q.F. guns and took over 300 prisoners. Total Russian losses reported at 10,000.
17th (F.) H.M.S. "Illustrious" arrived at Sheerness from the Mediterranean.
" " H.M.S. "Gibraltar" paid off at Portsmouth.
18th (Sat.) 2nd Bn. Royal Sussex Regiment left England for Malta in the "Dunera."
19th (S.) H.M.S. "Sparrowhawk" struck rock at mouth of Yangtze and foundered.
" " Launch of first-class battle-ship "Reina Elena" from the dockyard Spezia, for Italian Navy.
21st (T.) H.M.S. "Terrible" commissioned at Portsmouth for relief service to China.
23rd (Th.) H.M.S. "Lancaster" left Portland for the Mediterranean.
" " Marquess Oyama was appointed to the supreme command of the Japanese armies in the field, with Major-General Kodama as his Chief of the Staff.
26th (S.) H.M.S. "Minerva" left Plymouth for Mediterranean.
27th (M.) 2nd Bn. Royal Sussex Regiment arrived at Malta from England in the "Dunera."
" " The Fen-chu, Motien, and Ta Passes were captured by the Japanese under Generals Kuroki and Nodzu.
28th (T.) 4th Bn. Royal Garrison Regiment left Malta for South Africa in the "Dunera."
" " 4th Bn. King's Royal Rifle Corps arrived in England from South Africa in the "Sicilia."
" " The French Waterloo Memorial to French soldiers killed in that battle was unveiled on the battle-field of Waterloo.
30th (Th.) H.M.S. "Royal Arthur" paid off at Portsmouth.

FOREIGN PERIODICALS.

NAVAL.

ARGENTINE REPUBLIC.—*Boletin del Centro Naval.* Buenos Aires: May-June, 1904.—Has not yet been received.

AUSTRIA-HUNGARY.—*Mittheilungen aus dem Gebiete des Seewesens.* No. 7. Pola: July, 1904.—"Remarks on the Russo-Japanese War" (*continued*). "Construction and Fitting out of the new 15,000 Steel Floating Dock at Pola." "The Navigator's Prism." "Improvements in Torpedoes." "The Hurricane from the N.N.W., on the 4th May, at Pola." "The English Naval Estimates for 1904-5." "The German Naval Estimates for 1904." "Foreign Naval Notes."

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NOTICES OF BOOKS.

The Bayard of India: A Life of General Sir James Outram, Bart., G.C.B., etc. By Captain LIONEL J. TROTTER. Blackwood & Sons, London and Edinburgh, 1903.

The Life of John Colborne, Field-Marshal Lord Seaton, G.C.B., etc. By G. C. MOORE SMITH, M.A. John Murray, Albemarle Street, London, 1903.

Although the careers of the two men whose biographies now lie on our table ran in widely different tracks, there is one point in which the two lives closely resemble each other. Each is the perfect representative of a type—different in each case—that is bred in only one military organisation in the world, that of the British Empire. Outram is the perfect type of what the Army of India can produce in the way of British officers. John Colborne is equally typical of the best that the regimental system, that permeates the British Army far more than any other, can produce.

In a sense, the Indian Army breeds a type that is more closely akin to the genius of the race than any other type that the Public Service produces, with the solitary exception of the naval officer. Like the Navy, the training and environment that the Indian Service gives to a man tend, when the material is good, to produce a type that is all-round useful; a Jack-of-all-trades, and a master of a good many. Always good soldiers, they are, as a long string of names could be quoted to testify, diplomats, superb administrators, conscientious dispensers of justice, and most tactful handlers of men whose civilisation may be somewhat behind that of the West, but in whom the best of human qualities are quite as much in evidence. Outram was a perfect type of the best kind of officer that India breeds. To prove it one has only to glance at his career: He joined the Army of "John Company" before he was seventeen years old. He had scarcely reached the age of twenty-three before he had earned the thanks of the Governor-General and the Commander-in-Chief, officially rendered. This was for the capture of Malair, where, as Captain Trotter tersely puts it, "the flag of the Maratha Peshwa waved defiance to the Government of Bombay." The coolness, pluck, and military adroitness of the boy subaltern, in command of 200 sepoys of the old 11th Bo. N.I., and what are now the 123rd Outram's Rifles, had promptly suppressed a rebellion that was causing very considerable anxiety and occasioning much fluttering in the Government dovecote. And this before the movement of the troops intended for the suppression of the rebellion. This is how Outram puts it in his report to Captain Newton, the Brigade-Major of Malegaon:—

"I have no copy of my instructions; they merely required me to protect the town of Malair (situated two miles from the hill fort) until the assembly of a force which was ordered to be in readiness to supress the

rebellion, consisting of a brigade of infantry from Surat (distance 120 miles), a battery train, and infantry escort from Jaulnah (180 miles), and all the disposable troops under Major Rigby from Kokurmunda (50 miles), which latter did not arrive till three days afterwards, and the former, in consequence of my successful measures, were countermanded."

From that day Outram had his grip of success, and he never lost it from the pacification of the Bhils in 1833, through the Afghan war of 1839, in Sind, at Baroda, as Resident in Oude, in Persia, and finally his crowning triumphs of the Mutiny days. The story is known to every schoolboy, and is a standing proof of what the old Indian environment and training could produce when it had proper material to work upon. In his recent autobiography—he is speaking of the type to "cooly lead troops under a heavy fire, and inspire them with confidence and daring as he did so"—Lord Wolseley says of Outram :—

"This is the rarest quality of nerve in man; and of all whom I ever knew, I would name General Sir James Outram as having possessed it in a superlative degree. Whenever, my reader, you meet such a man, mark him well, for he is born of God to command."

Russia, France, and other countries employ and possess on some considerable scale "native" troops; but no race other than the Anglo-Saxon has shown the capability of organising and leading them, so that they are fully on a par, man for man, and unit for unit, with Europeans. This our Indian Army has done, and is doing, and Outram is superbly typical of the type of officer under whom the work is accomplished.

Similarly, Colborne is typical of what can be produced in the best school of regimental training. This also is, in a sense, a thing unique to the British Army. In other Armies there is not the regimental spirit in the sense in which we understand it, at any rate, as far as the commissioned ranks are concerned. Except in the German Army, there is no officers' mess; non-commissioned officers on promotion are usually transferred to other units. With conscription there cannot be the camaraderie between the commissioned ranks and the rank and file that is inherent in the units where all serving under the colours are volunteers. It is hardly going too far to say that with us the unit is a living organism, whereas in other Armies it is a machine for producing a periodic output of so much strength for the Reserves. Colborne's service, staff as a good deal of it was, was always closely in touch with the regimental units with which he was connected; and the result was the most perfect type of brigadier that any Army could produce. As a regimental commander, it was that his sterling worth was shown, and it was Colborne who, wheeling the 52nd "on its left as a pivot as if it had been a single company, to stem the last onset of the Imperial Guards, hurling them back in dire confusion," played no small part in the winning of Waterloo. His selection for important civil administrations proved to the hilt that the school he had been bred in was capable of producing the man. His administration as Chief Commissioner of the Ionian Islands showed his shrewd judgment and political insight. In Canada, where his work earned him his peerage, his rule was equally characterised by firmness and moderation.

It is worthy of note that two brothers—both men who have left their mark on English history—conferred on the two men whose lives are under review, the eulogies that most attach to their memories. It was Charles Napier who, at a dinner at Sukkur, gave Outram the designation by which he will go down to posterity: "Gentlemen, I have told you that there are to be only two toasts drunk this evening; one, that of a lady,

the Queen, you have already responded to. The other shall be for a gentleman. . . . . Gentlemen, I give you the Bayard of India, *sans peur et sans reproche*, Major James Outram, of the Bombay Army."

It was his brother, George Napier, who thus characterised Colborne: "Few men are like him; indeed, except the Duke of Wellington, I know no officer in the British Army his equal."

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THE BARR AND STROUD RANGEFINDER ON NAVAL MOUNTING.

THE RAJAH OF BHUTAN AND HIS ESCORT.

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